

PUTTING THE “PLAY” BACK INTO DISPLAY:
INTERACTIVE EXHIBITS IN SMALL MUSEUMS

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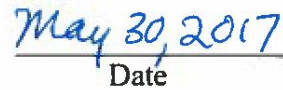
Advisor Approval

Putting the "Play" Back in Display: Interactive Exhibits in Small Museums

This project has been accepted and approved in partial fulfillment of the requirements for the Master of Science degree in the Arts and Administration Program by:



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Abstract

Museums of the late 20th and into the 21st century are moving from a focus on collections to museum audiences. The result of this shift culminates in more diverse programming, as well as more inclusive exhibition design for a participatory experience. Interactive displays and technology are often utilized to encourage a more hands-on museum visit. This graduate research project lays a foundation for the historical context of exhibits and interpretation; explores museum theorist insights on visitor needs; researches the internal and external influences of exhibition development; and ultimately answers the question of how museums can develop interactive displays on a minimal budget. The purpose of the research is to offer guidance for museums to create interactive exhibits on a small budget, while including computer-based and noncomputer-based activities. The result of this research is a comprehensive list of interactive display categories and suggestions for how inexpensive and sustainable technologies can be woven into the exhibition development plan.

Key Words

Interactive displays

Museum exhibits

Hands-on

Participation

Organizational structure

Budget

Small or minimal budget

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Acknowledgements

Thank you to Dr. Alice Parman for your support and expertise in the research process. Your advice and encouragement in completing this project are invaluable. Also, Dr. Patricia Lambert for making time for each research student and acting as an outstanding example of what an arts manager should be.

Thank you to the staff and leadership at the MNCH. Your support has allowed me to grow and thrive in the museum world.

Thank you to the lifelong friends I have found in my cohort

Thank you to my family, especially my parents, for giving me the encouragement and spirit to accomplish more than I ever thought possible.

Finally, my husband, Brian, thank you for every sacrifice you have made to help make my dreams come true.

Chapter 1: Introduction and Background

Problem Statement

Since the 1970s and 1980s museums have increasingly included interactive exhibits to enhance visitors’ experiences. These displays can be as simple as a question posed on a label with the answer revealed under a tab, or as complex as a digital touch screen with opportunities to explore multiple content areas. According to the Institute of Museum and Library Services, “...there are 35,144 museums in the U.S., more than double the agency’s working estimate of 17,500 from the 1990s” (2015). Many of these museums depend on minimal paid staff (0-10) and small budgets (\$0-\$50,000). These limitations make it unrealistic for museums not only to install high-tech devices, but also to maintain them.

Though there is extensive research about both visitor engagement and creating interactive displays for exhibits, there is a lack of research about development of interactives on a small budget. Many “cookbooks” and do-it-yourself kits assist in the production of these exhibits. However, they do not address the influences, such as policies, procedures, and budget that affect the production process. The number of museums operating with scant resources only seems to grow, making it difficult to maintain touchscreen displays in a technology-driven world. This research identifies these various factors that affect interactive exhibition design and reveals how museums overcome barriers to provide engaging, interactive displays in their exhibits.

Conceptual Framework

The concept schematic represented in Figure 1 of this research includes background information, internal and external influences, the creation of interactive displays, and resource development. Concept A designates relevant background information.

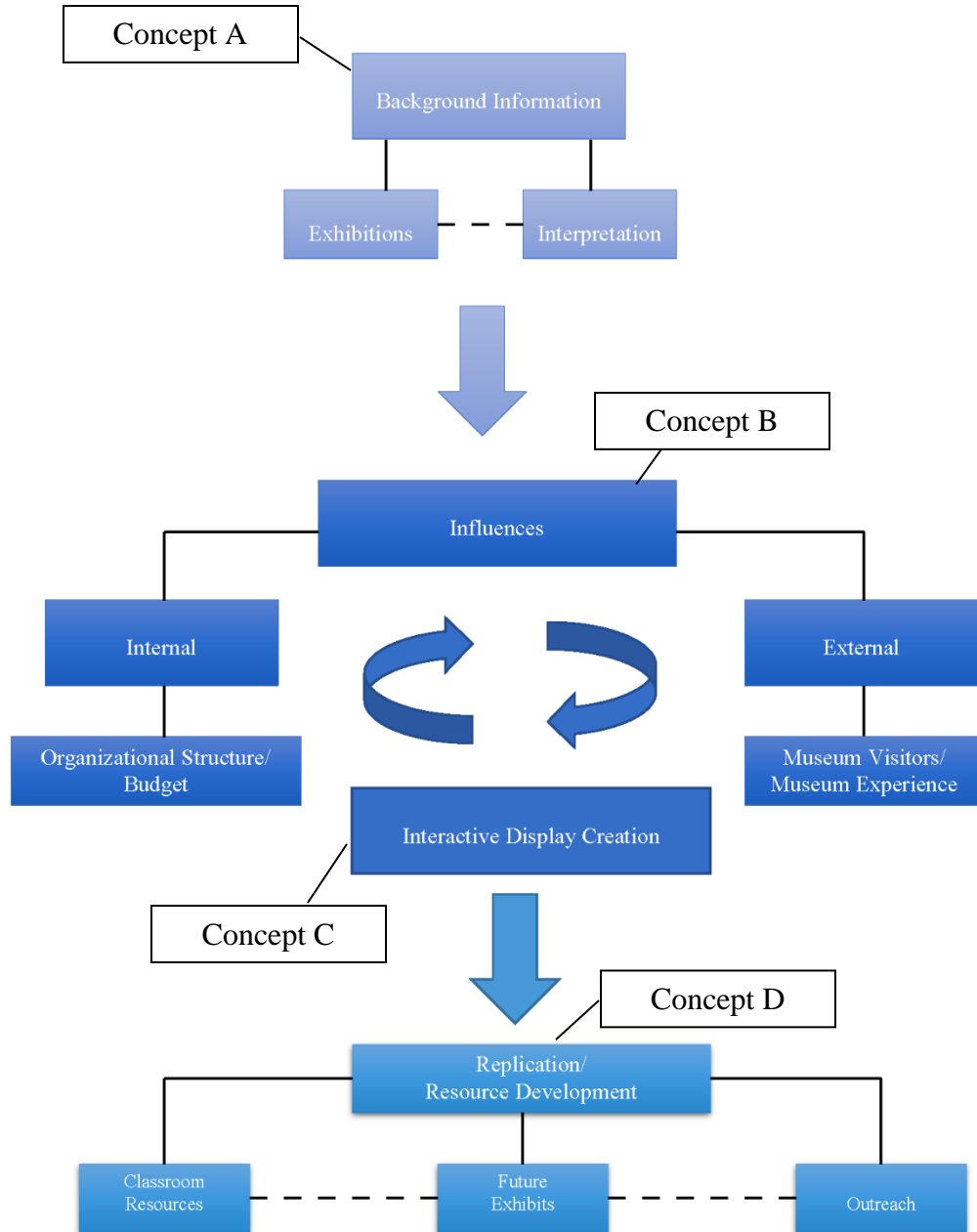


Figure 1: Concept Schematic

The literature review addresses historical background and museum theory approaches, to provide context for exhibition development and interpretation. Concept B designates both internal and external influences on interactive display creation. External influences include the museum visitors and what museum theory says about them. Works by museum theorists and previous research on museum visitors provide further background information. Additionally, case studies

at history and science museums in Eugene and Portland, Oregon take into account internal influences from the museum’s organizational structure (mission, vision, goals, etc.) and the museum budget. Concept C is the research question, “How do museums create interactive displays on a budget?” Lastly, Concept D references analysis and synthesis of the research question findings. The information gathered through the research can serve as a guide to development of inexpensive interactive displays, with suggestions for replicating them for use in future exhibits, outreach displays, and classroom resources. Each concept area supports the structure of the research and connects to the main topic of creating and developing inexpensive interactive exhibits.

Research Methodology

Purpose Statement

The purpose of this research was to understand how interactive displays are built in museums with small budgets. Using a mixed methods approach, I analyzed both qualitative and quantitative data to understand the variables that influence the process of developing and creating exhibitions in museums. I positioned myself within the constructivist worldview. John W. Creswell (2014) describes this methodological paradigm: “Individuals develop subjective meanings of their experiences—meanings directed toward certain objects or things” (p. 8). The research relies heavily on case studies and interviews with museum professionals working within the case study sites. The observations and insights provided by the interviewees shaped the analysis of the data, as well as the outcome of the research. I was open to multiple viewpoints and opinions; therefore, the reality of the research was constructed through interactions with each individual.

Research Methodology and Research Questions

The constructivist methodological paradigm helped me to explore not only how museum staff develop and create interactive displays, but also how they complete these tasks on a minimal budget. Other research questions were:

- What makes a display interactive?
- What types of interactive displays are typically found in science and history museums?
- Is it necessary for interactive displays to include technology?
- How can these interactive displays be replicated for outreach and/or classroom purposes?

Definitions

In order to sufficiently answer these questions, specific terms and phrases were defined.

Interactive displays refer to any portion of an exhibit in which a visitor must use one of the five senses (touch, see, hear, taste, or smell) to engage with the exhibit. For example, an interactive display could include watching a video, listening to a sound sample, or lifting a tab to reveal additional information. **Museum exhibits or exhibitions** include any organized collections, objects, and/or panels accessible to the public that relate to a museum’s content area. The museum’s **organizational structure** includes any components that inform how the museum operates. These areas include the mission, vision, goals, policies, and procedures. The **budget** refers to the amount of money the museum uses to operate throughout a fiscal year. **Minimal or small budgets** refer to museums operating on \$0-\$50,000 per fiscal year. The study focused

primarily on the budget allocated for the museum’s collections, exhibits, and any additional interpretive materials.

Delimitations and Limitations

Due to the short timeframe in which the research was conducted, some necessary delimitations were determined. The research does not include case studies of museums throughout the United States, excluding sites in areas outside of the Pacific Northwest. Additionally, the perspective was limited to the Willamette Valley of the Pacific Northwest in Eugene and Portland, Oregon. Art museums are not included in the study, due to a perceived lack of participatory, interactive opportunities in their exhibit galleries.

Some limitations apply to the case study sites, interviews, and data collection. Though the research included an inventory of what interactive displays are in use in museums, not all museums had these various types of displays. For example, some sites lacked technology aspects, removing the ability to make a comparison on whether or not an interactive display requires technology. Therefore, findings from this study are not generalizable to all museums.

Objective

The overall objective of the research is to provide museums with suggestions, as well as a model for how interactive displays can be built with few financial resources. The examples collected from case studies provide a set of categories of various interactive display styles. The research also addresses whether technology is a necessity or a luxury when creating interactives. Lastly, best practices and recommendations for building interactive displays on a small budget are provided to readers in the concluding chapter.

Research Design

The research used multiple strategies of inquiry including case studies, interviews, and document analysis. These mixed methods included both open-ended qualitative data and closed-ended quantitative data (Creswell, 2014, p. 217). More specifically, the research design follows the Exploratory Sequential Design, where the qualitative research is primary and the quantitative research is secondary (pp. 225-226). The document analysis helps to generalize the population of the specified case study sites, and provides additional validity to the study. The specific sites, interviewees, documents, and risks and benefits are described in the following sections.

Case Studies

The case study inquiry approach provides the bulk of the collected data. Zina O’Leary (2014) defines a case study as “A method of studying elements of our social fabric through comprehensive description and analysis of a single situation or case...” (p. 194). O’Leary goes on to define two main elements of a case study—description and analysis (p. 194). Robert Stake (1994) provides more detailed information for the intent of a case study: “...each case study is a single inquiry into a single case...A case study is both the process of learning about the case and the product of our learning” (p. 236). Each case study describes elements of interactive displays and analyzes their role within the exhibit context.

The case studies were conducted at science and history museums in Eugene and Portland, Oregon. The museums included in the study are: The Museum of Natural and Cultural History, the Lane County Historical Museum, the Oregon Museum of Science and Industry, and the Oregon Historical Society. The sites were chosen due to their locations, content areas, and perceived exhibition designs. Additionally, each museum in the study can be compared to a

similar counterpart (i.e. Lane County Historical Museum and Oregon Historical Society). Art museums were not included in the study due to the lack of interactive opportunities with art collections, as well as a means to narrow the scope of inquiry to ensure the completion of the research timeline (Appendix A).

Interviews

Semi-structured interviews support the constructivist paradigm, as well as provides further context for each case study. Carol Warren (2002) offers a suggestion for how to approach these interviews, “...frame it...aiming to understand the meaning of respondents’ experiences and life worlds” (p. 83). The intent behind conducting open-ended interviews was to allow interviewees the freedom to provide unique responses relying on their personal experiences.

Warren goes on to explain the importance of these varied perspectives:

...both researchers and respondents—speak to each other not from stable and coherent standpoints, but from varied perspectives...Although situational, these perspectives shape the flow if the interview and, in its qualitative version, are taken into account by their interviewer in understanding the meaning-making process (p. 84).

The responses to the interviews provided some internal context about how the museums operate, how they are supported, and what their planning processes entail. The semi-structured interview allowed for unplanned questions to be asked and answered, which provided more depth and expanded the scope of the research design.

Interviewees were chosen by their affiliation with the case study sites and by their respective area of expertise. Paid staff working at the various case study sites in departments of education, public programming, and exhibition design were recruited for the interviews. In order to make appropriate comparisons within the data, paid employees from other departments and volunteers were excluded from the interviewing process. Of the six individuals who were asked

to be interviewed, three responded. Two interviews were held simultaneously because the interviewees often worked together and agreed it would be more appropriate to be interviewed together. The third interview was conducted over the telephone because of conflicts in scheduling. The remaining three interview requests were either declined or unresponsive.

Document Analysis

The document analysis also assisted in understanding the internal influences on interactive display creation. Researching and comparing organizational structures and budgets helped generalize the data into various demographics. Glenn Bowen (2009) provides a clear definition, “Document analysis is a systematic procedure for reviewing or evaluating documents—both printed and electronic (computer-based and Internet-transmitted) material” (p. 27). He goes on to say, “...[it] requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge” (p. 27). The purpose of analyzing selected documents was to understand the values, goals, mission, policies, and procedures that impact the development of interactive displays. These documents helped to triangulate the data to provide further validity and reliability in the study. The documents that were analyzed include employee handbooks, policies and procedures, IRS 990 tax forms, marketing material, and additional materials suggested by the interviewees of the case study sites.

Potential Risks and Benefits

Although the risks for individual participants were low for this study, there were some potential ethical issues. Both the interviews and document analysis required in-depth research into each case study site’s organizational structure. Individuals could have felt uncomfortable or

may have been unable to share some information or opinions about these policies and procedures. While some documents were provided to the public (IRS tax forms, mission, goals, values), others were not openly shared (policies, procedures, employee handbook). Though the research called for these documents, when necessary, they were excluded in the study to protect individuals and/or the case study sites.

The research design and strategies of inquiry revealed that many museums are operating on smaller budgets, yet produce engaging interactive displays to the public. It also helped to determine specific definitions for various interactive components, types of displays, and how they are utilized in different museums. The case study sites do not have specific parameters for how exhibits and displays must be developed. For each site, however, the overall development process encourages departments to work together to align programs and exhibits with the museum’s mission, goals, and values. In this sense, each case study site had a similar organizational structure. Findings from this research should benefit both smaller and larger museums, as well as their staff and constituents. The research supports the need for inexpensive, yet meaningful exhibit design that includes computer- and non-computer-based technology.

Data Collection and Analysis Procedures

Data Collection Schematic

The data collection schematic represented in Figure 2 details the areas in which information was gathered to support the study. A thorough literature review provided context for understanding the internal and external influences of exhibition design within museums. The literature review focused on exhibit development, interpretation, visitor engagement, visitor

experience, and technology, giving the reader further context for the study. Four case studies were conducted at science and history museums in Eugene and Portland, Oregon.

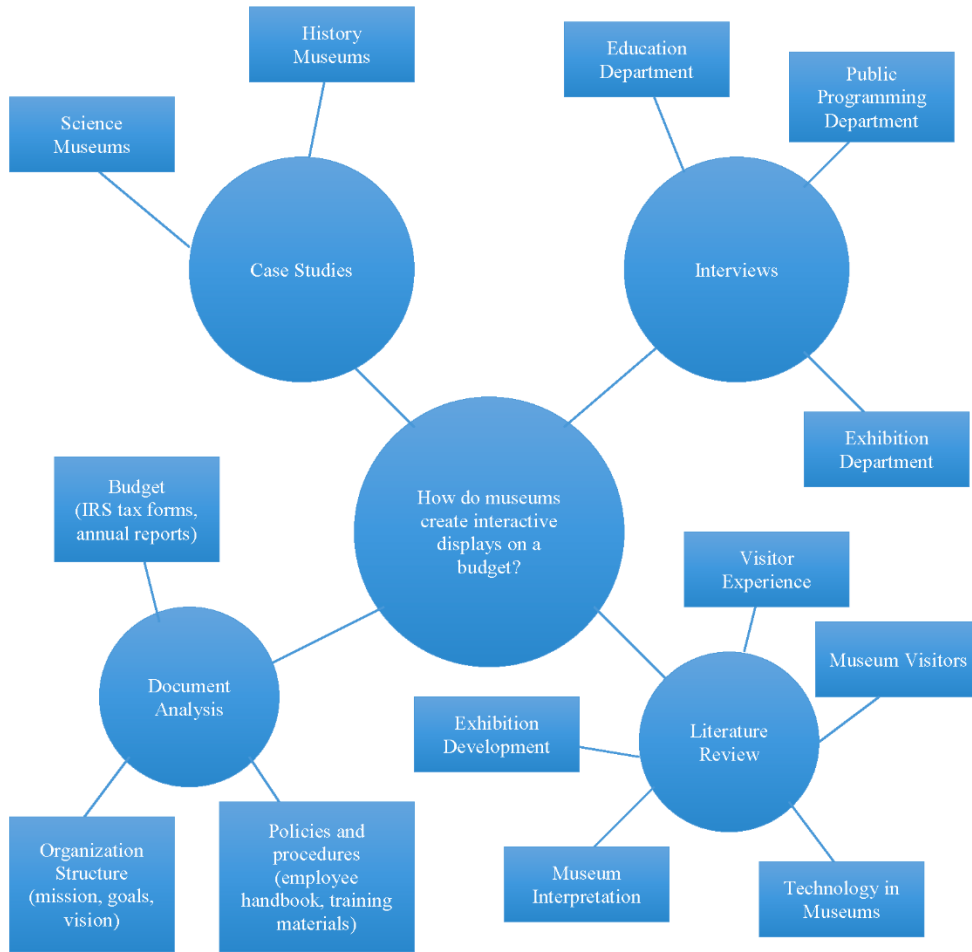


Figure 2: Data Collection Schematic

The case studies provided an overview of each museum, described the organizational structure, and described the exhibitions and the accompanying interactive displays. Interviews with paid staff from the case study sites provided individual perspectives on the exhibit design process and organizational structure. These interviews were conducted in a semi-structured format to ensure that each interviewee answered specific questions, but also allowed for additional, spontaneous questions and responses that further clarified each interviewee’s perspective. Document analysis

of published budgets, policies, procedures, and organizational structure materials enabled comparisons among the four case study sites. The research instruments for each of these methods can be found in Appendix B.

The case studies took place at selected science and history museums in Eugene and Portland, Oregon: the Lane County Historical Museum, the Oregon Historical Society, the Museum of Natural and Cultural History, and the Oregon Museum of Science and Industry. Each museum was chosen on the basis of location, potential for comparison to the other selected sites, and the content area. Children’s museums were excluded because of their extensive amount of interactive displays, and because at the time of the study there was no children’s museum in Eugene. Additionally, art museums were excluded from the study due to a perceived lack of interactive display opportunities.

Interviewees were paid staff within departments of education, public programming, and exhibition design. Because many of these staff worked interdepartmentally during the exhibit development process, each interviewee provided a unique perspective on the internal influences regarding exhibition development and interactive display building. The interviewees ranged in age (between 25-50), and gender identity (male and female). Each potential interviewee was contacted via email or telephone following a recruitment letter and/or script (Appendix C). Other staff members and volunteers were excluded from the study because they did not meet the criteria of being a paid staff member or did not work within a relevant department.

Once interviewees agreed to participate in the study they were provided with a consent form (Appendix D) detailing the purpose of the study, potential risks, and their rights as a participant. Interviews were scheduled once each interviewee agreed to participate in an interview. An overview of the consent agreement was verbalized prior to each interview and

verbal consent was provided by interviewees prior to the first question. Each interview was audio recorded and transcribed, as well as notated within the field notes. All collected data (interview recordings, transcriptions, and field notes) were kept confidential. Participants were given pseudonyms to protect their identity and to maintain confidentiality. Physical materials were kept in a locked safe, while computer files were embedded and coded on a password-protected device. Six months after the final research presentation, all physical data will be shredded and computer-based data will be permanently deleted.

There was minimal risk involved in the study. When interviewees felt uncomfortable sharing personal opinions pertaining to policies, procedures, or other organizational structure elements, they were invited to skip the question or terminate the interview. Though their responses are confidential, they were free to withhold any information they felt was a risk to share. While there were no individual benefits to participating in the study, participants did benefit the greater museum sector. Their responses and data were compiled into a best practices and recommendations chapter, which can be utilized by museums throughout the U.S. to build interactive displays on a budget.

As mentioned above, the data were collected using audio recordings, photographs, and field note outlines. Once all data was collected, it was input in tables and compared between case study sites. The organizational structure materials and interviews were color coded for common terms and phrases, as well as for overarching subjects of education, exhibition development, visitor experience, museum purpose, and budget. These tables and outlines were revised to accommodate additional categories not previously delineated in the research proposal. The document analysis triangulated the collected data to further validate the findings.

Investigator Experience

Baylie Stillwell holds a B.A. in Vocal Music Education from Southeastern Louisiana University in Hammond, Louisiana. Post-graduation, she worked as a Kindergarten-8th grade general music and choir teacher in St. Charles Parish Public Schools in Destrehan, Louisiana, as well as in St. Tammany Parish Public Schools in Folsom, Louisiana.

Most recently, Ms. Stillwell completed a summer internship with the Smithsonian Institution Traveling Exhibition Service’s Museum on Main Street program. She researched the inclusion of creative placemaking, local history, and local culture in rural arts organizations and museums throughout the United States. Her research is being used during the development phase of an upcoming traveling exhibit about the history of rural America. The research will also be included in information packets distributed to state humanities councils to market the future exhibition.

Currently, she is completing coursework to obtain an M.S. in Arts Management and a certificate in Museum Studies at the University of Oregon. She is the Graduate Laurel Award Education Assistant at the Museum of Natural and Cultural History where she is responsible for planning and implementing a monthly Pre-K program, *Little Wonders*, Family Day events, and other educational programming. She has completed coursework in research, research methods, and literature reading in the Winter 2016, Spring 2016, and Fall 2016 terms. For more detailed information about Ms. Stillwell’s academic and work experience, see Appendix E.

Chapter 2: Literature Review

Introduction

The literature review addresses five topics: historical context, interpretation, exhibition development, museum visitors, and interactive exhibits. The historical context addresses museum and education theories, as well as theories from relevant museum professionals in exhibition planning spanning the past century. Interpretation and exhibition development are approached through the lens of the needs of museum visitors. The final topic of the review references pertinent understanding in how interactive displays are created with the support of interpretation, exhibition development, and audience needs and motivation. Though each overarching topical area often overlaps with one another, each resource places an emphasis on one of the main content areas.

The literature review reveals the interconnectedness among these subjects, as well as the integration of the museum visitor into these subjects. Especially telling is the importance of interactives and participatory experiences in displays to better connect with audiences. In sum, the museum visitor lies at the center of museum work. To maximize engagement with the visitor, exhibits should have physical elements capable of manipulation by visitors. The proverb, “I hear...I forget. I see...and I remember. I do...and I understand” eloquently summarizes the need for interactivity in exhibits (Russick, 2010, p. 220).

Historical Context

Beginning in the late 19th century, select museum theorists and professionals began to encourage museum reform. John Cotton Dana’s (1917) classic selection, *The Gloom of the Museum*, narrates the museum theorist and librarian’s criticism of the American art museum

practices. Each criticism is accompanied by suggestions for how to improve and move into the 20th century by better serving the public. The prologue summarizes his vision: "...these objects being bought for us will be put where the most people can most handily use them: in a museum planned for making the best use of all it contains, and placed where a majority of its community can quickly and easily visit it" (p. 17). Dana goes on to discuss the physical location and building of the museum, the high price of artworks, and the vast extent of the collections. Though he says museums are "...usually housed in buildings fashioned to look like Greek temples or Renaissance palaces...often in remote parks," he goes on to suggest they should rather be "...located that it may be reached by a maximum number of persons with a minimum expenditure of time and money" (pp. 23-25). However, Dana's most influential suggestion comes from his criticism of museum administration. "Some of the best of our museums...are now pluming themselves on the fact that they employ one—only one—person to make their collections more interesting to the thousands who visit them" (p. 30). Dana's blunt criticism ushered in new museum theories and prioritized areas of museum education, exhibition design, and interpretive programming in museum practices.

The "transitional movement known as the New Museum Idea came to believe that natural history museums could no longer ignore audiences" (Rader & Cain, 2014, p. 9). Though the movement was inspired within the walls of natural history museums, it spread throughout the museum sector, inundating the exhibition planning process. These reformers came to be known as "museum men [and]...worked to realize exhibits' educational potential in these decades" (p. 9). This movement initiated a transition from a collections/research-based institution to a visitor-based institution. The transition influenced not only how museums developed their exhibitions and displays, but also how curators selected collections. Instead of relying on objects with "little

or no display appeal,” curators were encouraged “to build collections that were of little value to scientists but illustrated those aspects of the biological sciences the public found most exciting—and that curators believed were most important for them to know” (pp. 26-27). The more audience-friendly objects became known as teaching or display collections.

Other interpretive materials were developed to support the more inclusive museum model. In Lisa C. Roberts’ *Changing Practices of Interpretation* (2012), she offers some historical context: “Interpretive devices like labels, brochures, and lectures became a permanent fixture in museum halls...Initially, their content was largely information-based: dates, places, and facts...” (p. 144). Roberts pulls from John Cotton Dana’s suggestion to shift interpretation from facts to experiences. “He established many now common practices to increase the museum’s usefulness: for example, loaning objects to school classrooms, shops, and hospitals; creating a teacher-training course at local colleges; opening a ‘junior museum’ for children...” (p. 144). Museums became places of public service, as opposed to didactic institutions aimed at research. Roberts goes on to say, “Providing interpretation was the single most important thing museums could do to engage visitors with their collections” (p. 146). Museum interpretation continues to evolve and change as other museum studies fields are discovered. Thanks to theorists like Dana and reform groups like the museum men, more than a century later museums are developing interpretive plans alongside exhibition designs to create a more inclusive atmosphere for visitors.

Interpretation

Exhibition development is grounded in the overall objective of interpreting objects and collections to meet the needs of constituents and the institution’s mission. Marianna Adams and Judy Koke (2012, pp. 395-399) ask a series of topical questions to assist in the development of

Comprehensive Interpretive Plans (CIPs). They touch on the role of the museum, identifying the public, understanding community needs, defining the relationship between the visitor and the museum, aligning the goals of the museum with interpretation, and evaluating the accomplishment of said goals. Each of these topics connects the exhibit planning process, the visitor, and their interpretive needs. Identifying community needs and understanding the institution's relationship with the community are two vital concepts in developing a CIP. The authors write, "The days of just putting objects on display or creating interactive experiences that teach aspects of science, art, or history, are over. The museum must be more attuned to how communities are shifting and changing" (Adams & Koke, 2012, p. 397). Museums, like their communities, must continually evolve and change to meet the needs of their audiences. They cannot remain stagnant by interpreting objects and collections the same way for each new exhibit. Likewise, the museum's relationship to its constituents should be changing as they develop new target audiences. Adams and Koke (2012) write, "More than repositories of knowledge and objects, museums are shifting to creating an environment where ideas are explored and meaning is made" (p. 397). Interpretation is no longer seen as didactic, but as an opportunity for meaning making through various avenues.

Graham Black's (2005) chapter, "Applying the principles of interpretation to museum display" from *The Engaging Museum: Developing Museums for Visitor Involvement* provides a brief history of museum interpretation, including excerpts from museum theorists like Freeman Tilden, as well as resources for further reading. Black (2005) states, "...interpretation cannot be seen in isolation" (p. 180). Tilden's (1977) six principles (Figure 1) of interpretation align with the multi-faceted realms in museum practice such as exhibition development and visitor studies (p. 9). Black (2005) also developed some parameters of interpretation. Among the twenty-three

principles he touches on are aspects of research, inclusivity, museum visitors, participation, multi-sensory experiences, rest, and social interaction (Black, 2005, pp. 187-207). Like Adams and Koke (2012), Black (2005) emphasizes the need for an interpretive plan.

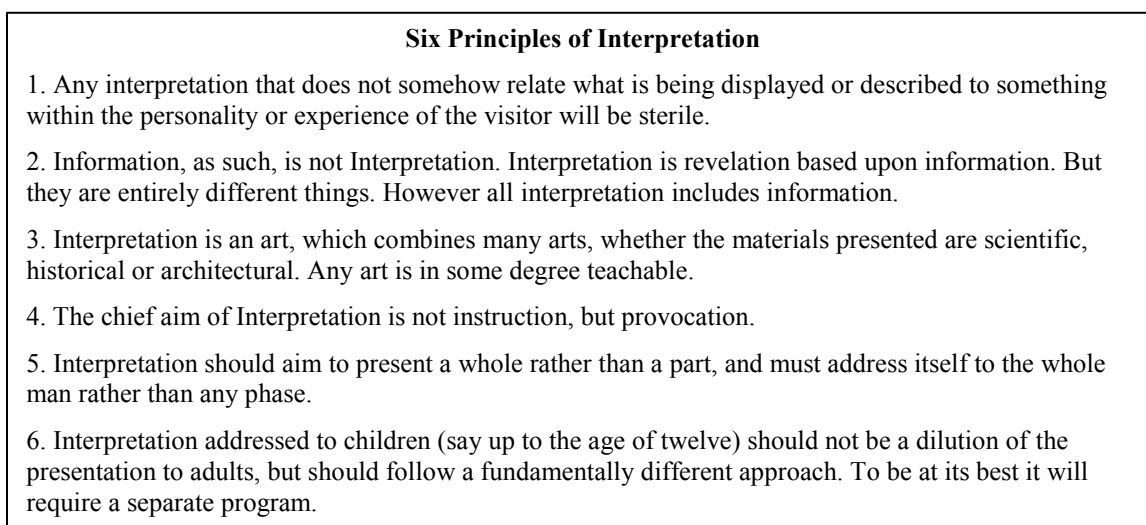


Figure 1: From Freeman Tilden's *Interpreting Our Heritage* (1977)

“Exhibition development should be based on an outline *interpretive plan*. There are many alternative ways of devising the plan” (Black, 2005, p. 195). He goes on to summarize his interpretive approach:

A true interpretive philosophy which...

- believes entirely in an audience-centered approach to exhibition development
- sees the museum visit as an opportunity for the museum and its visitors to take part in a journey and in a conversation together (p. 208)

Black (2005) and Adams and Koke (2012) align interpretive planning with exhibition development; one aspect cannot be completed without the other.

Exhibition Development

Arminta Neal's (1976) *Exhibits for Small Museums* is beneficial when considering the step-by-step process of exhibit design. The text not only includes templates for design aspects

such as floor plans, labels, and construction, but also tips for each step of the exhibit process from conception to presentation. Especially useful are the second and seventh chapters to better understand development and implementation aspects of design. Neal (1976) states, “Use of such a storyboard may help you organize your thoughts” (p. 12). These storyboards help to organize the exhibit team’s thoughts and ideas, as well as provide a foundation for creating the exhibit plan. The exhibit plan should include three columns: topics, objects, and exhibit methods (pp.15-27). Museum workers can determine the topics the exhibit will include, while considering the objects available in collections and how the elements will be represented. Neal (1976) provides examples and resources throughout the text for each aspect of exhibition design. Though the text does not provide historical or theoretical context, it is a practical resource for putting theory into practice.

While Neal’s (1976) book offers groundbreaking exhibit development procedures, *Exhibit Makeovers: A Do-It-Yourself Workbook for Small Museums*, published 2017, provides more contemporary museum practice guidelines. Writers Alice Parman, Ann Craig, Lyle Murphy, Elizabeth White, and Lauren Willis outline how museums can renovate a single case, an exhibit, an exhibit hall, or an entire museum. Most relevant to the purposes of this literature review, though, is the first chapter, “Exhibit Makeovers.” Prior to fabricating any physical materials, exhibit developers should determine the take-home message, as well as the storyline. The authors explain: “The storyline expands on the take-home messages, encapsulating the core meaning of the exhibit in a succinct and compelling way. The storyline is the premise of the exhibit and answers the questions: ‘So what? Why go to all the time and trouble to create this experience for visitors?’” (p. 3). Exhibits and interactives should have a clear purpose and meaning. The workbook continues with diagrams, templates, and worksheets to assist in the

completion of the exhibit makeover project. More detail for the fabrication process can be found in Chapter 3, “Design and Install Your Single-Case Exhibit Makeover” including label and case design suggestions. (pp. 19-29). It continues with more details about exhibit, exhibit gallery, and small museum makeovers. The book closes with a section on community involvement, especially focusing on the museum visitor audience. The authors explain the importance of visitor participation: “The opportunity to participate in meaningful ways can be very rewarding for visitors. And museum insiders might learn something from what the visitor tells us!” (p. 81). Overall, the book is an excellent resource for the exhibition development process, as well as for focusing on the purpose of exhibits.

Exhibitions have several purposes within the museum. They are a primary institutional function, a means of communication, and allow visitors to apprehend content. Barry Lord (2002) distinguishes between museum exhibitions and other types of displays, “[they] present objects for display...as a method of education” (p. 15). Throughout the article, “The Purpose of Museum Exhibition,” Lord directly connects the purpose and development of exhibitions to museum visitors. He states, “Museum exhibitions address our awareness of the world, and affect our attitudes and values” (p. 17). Later, the purpose of museum exhibitions is delineated as a transformation of “...some aspect of the visitor’s interests, attitudes, or values affectively, due to the visitor’s discovery of some level of meaning in the objects on display—a discovery that is stimulated by the visitor’s confidence in the perceived authenticity of those objects” (Lord, 2002, p. 18). In short, exhibits act as a means of communication to the visitor. Delivery of these messages can be portrayed in myriad ways: audio-visual images, interactive experiences, three-dimensional models, art, phenomena, or areas of specific content. Regardless of the form, exhibits help visitors to apprehend by means of contemplation, comprehension, discovery, and

interaction (Lord, 2002, p. 19). Seemingly, interaction is the most favored. Through hands-on displays, person-to-person contact, or multimedia programs visitors are able to take an active role in the exhibit. Lord (2002) concludes with, “Understanding the purpose of museum exhibitions and the ways in which visitor apprehension of exhibits may be varied...provides a basis for the planning and evaluation of these unique methods of communication” (p. 25).

After understanding the purpose of museum exhibitions, the next step is to develop focused goals, as well as identifying messages to be delivered to specific audiences. Tim Caulton (1998) states, “The most critical factor for the successful design and development of hands-on exhibits is the setting of appropriate goals for targeted visitors. The development process begins with a broad conceptualization of the exhibition and potential exhibits within it, and of the type of activities that will take place” (p. 39). Caulton (1998) describes three forms of exhibit development:

- 1 All exhibits are conceived, designed, and constructed in-house.
- 2 All exhibits are conceived in-house, but are designed and constructed by contractors.
- 3 All exhibits are conceived, designed, and constructed by contractors. (p. 41)

Each museum is unique in its exhibition design process; however, most museums include a mix of each form. Successful exhibit design also includes an evaluation process to inform its content, message, and physical elements. Evaluation methods include visitor surveys, front-end analysis, formative evaluation, and summative evaluation (pp. 45-48). Similar to the forms of exhibit development, diverse evaluation methods should be included in the process. Caulton (1998) emphasizes the important role of the visitor: “...an essential prerequisite of an effective exhibition is that all exhibits are evaluated with target visitor groups” (p. 55). Each scholar continues to point to the visitor as the focal point of museum work.

In *Creating Exhibitions*, authors Polly McKenna-Cress and Janet A. Kamien (2013) discuss the elements of exhibition design including collaboration, action steps, considering the institution, visitor experience, design, management, techniques, and processes. They especially emphasize the importance of developing content with the consideration of museum audiences. The approach is explained: "...the main philosophical issue for exhibit teams in exhibit development is to keep a primary focus on the needs of visitors" (McKenna-Cress & Kaimen, 2013, p. 91). Four questions must be asked when developing content for exhibitions:

Who is the primary audience for this exhibition?
 What is popular culture saying about this subject matter right now?
 What is the main need of my institution regarding this subject matter?
 Why do I care about this content? (pp. 91-93)

The answers to these questions will help developers understand who the audience is, the relevancy of the exhibit, and the alignment of the content with the museum's mission. After early concepts have been determined, the exhibition team will experience roughly five phases: Research, creating the Interpretive Framework, Schematic phase, Design Development, and Evaluation (McKenna-Cress & Kaimen, 2013, pp. 100-127). The Research phase includes areas of content, visitors, education, and collections. Next, the Interpretive Framework is determined by the mission and Big Idea, goals, and exhibition voice. The Big Idea "...focuses on a topic but can be approached from a visitor's perspective" (p. 104). McKenna-Cress and Kamien (2013) also advise, "...it is wise to identify and articulate outcomes that all team members understand and agree to" (p. 105). Once the conceptual framework has been devised, developers must organize the concepts and tell a story through a cohesive narrative during the Schematic phase (p. 115). Next, exhibit designers work through the details during the Design Development phase. This phase includes not only the physical elements of the exhibit such as labels and displays, but also the presentation of information and education programming (pp. 115-124). Although

exhibitions require evaluation throughout the design process, it is only possible to improve the design once visitors are able to interact with the exhibit (pp. 127-128). McKenna-Cress and Kamien (2013) end with the paradox of the “Theory of ‘Closer Approximations’”, where “...at every turn we are reevaluating, refining, and even recosting” (p. 128). Essentially, the exhibition team’s work is never complete, as it is continually being assessed and revised. Each revision has only one element at its center: the museum visitor.

Museum Visitors

The New Museum Idea museum places visitors at the epicenter of exhibition development. Eilean Hooper-Greenhill’s (2011) *Studying Visitors* offers context in the recently developed field of visitor studies: “A response to the call to become more visitor-focused will require considerable changes in the professional practices of museums” (p. 362). Visitor studies require museum professionals to consider who their audiences are and how to evaluate them. Hooper-Greenhill (2011) explains, “These studies focus on the experiences, attitudes, and opinions of people in and about museums of all sorts...” (p. 363). Without input from the visitor, exhibit designers can fail to reach their objectives: connecting the development and evaluation of exhibits with visitors. Though this concept may now seem obvious to most museum professionals, it was only understood through early research in museum studies. Hooper-Greenhill (2011) offers an example: “...it was learnt that information about the visitor’s level of understanding of the subject matter of the exhibition would be useful in designing the exhibition and in writing the labels...” (p. 366). She goes on to describe additional evaluation methods, such as counting and mapping, for understanding audience needs and motivations. Hooper-Greenhill (2011) recognizes the ambiguity of the intrinsic aspects of visitor studies in her closing words: “Unlike many intellectual fields, museum visitor studies encompasses desires,

perspectives, and experience from both academic and professional environments...it also establishes particular challenges for those who work and study in this area” (p. 374).

Though museum professionals are beginning to delineate methods for visitor studies, museums must begin any exhibition process by defining their audience. Ideally, museum audiences include *everyone*. Kathleen McLean’s (1993) *Planning for People in Museum Exhibitions* recognizes this challenge: “...exhibit planners are faced with the task of sharing often unfamiliar or unrelated experiences” (p. 2). Fortunately, exhibit planning for these general audiences can be simplified by considering the personal, physical, and sociocultural contexts in which their visits take place. McLean (1993) likens these experiences to the population’s use of media:

...museum visitors come for the same reasons they use other media: for information; for personal identity and reinforcement of personal values; for social interaction (to connect with family, friends, and society); and for entertainment and relaxation. (p. 5)

Entertaining audiences seems a simple task, yet exhibition developers must consider the educational value of a display, as well. McLean (1993) points out that “...museum learning is personal, self-paced, and exploratory by nature” (p. 9). Not only personalizing the experience, but also considering the diversity of learners become vital steps in exhibit design. McLean (1993) summarizes, “If exhibit planners are to provide something for the widest possible range of museum visitors, exhibitions must accommodate all types of learners” (p. 9). There are several models and approaches to consider when determining learning styles and types, but McLean (1993) focuses on Bernice McCarthy’s 4MAT model of learning styles and Howard Gardner’s theory of multiple intelligences. While these learning styles are considered when developing exhibits, planners need to place more importance on personally connecting with audiences. McLean (1993) states, “Whether they accept the invitations will depend, to a great extent, on

whether they can make personal connections and see something of themselves within...they expect museums to provide them with something significant for their lives” (p. 13). Museums must reach their audiences on multiple levels, whether through learning styles, personal needs, or by meeting a community need.

John H. Falk (2010), a museum theorist and educator, recognizes the more personal aspects of defining and understanding museum visitors. His different museum visitor identities are delineated in the chapter, “The Museum Visitor Experience: Who Visits, Why, and to What Effect?” from the collection *Reinventing the Museum*. A more tangible factor includes a timeframe: before, during, and after the museum visit. “Accurately understanding the museum visitor experience requires expanding the time frame of investigation so that it includes aspects of the visitor’s life both before and after their museum visit” (Falk, 2010, p. 318). Falk developed “identity-related feedback loops” using the influence of this timeframe, as well as a visitor’s pre-determined expectations. The five typologies of visitors are: explorers, facilitators, professional/hobbyists, experience seekers, and rechargers (Falk, 2010, pp. 324-325). Though these groups are clearly defined, individual visitors may identify differently day-to-day. Falk (2010) states, “...these categories are not permanent qualities of the individual” (p.325). Falk (2010) summarizes, “...categorizing visitors as a function of the five identity-related motivations yields some measure of predictability about what visitors’ experiences will be like as well as qualitatively, what visitors are likely to find memorable” (p. 326). Exhibition teams can consider these motivations when creating their designs.

John H. Falk and Lynn D. Dierking (2016) provide deeper context to museum visitor identities and motivations in *The Museum Experience Revisited*. They inquire: “...are museums fulfilling their role as trusted social institutions and community stewards? Is their work fully and

meaningfully connected to the fabric and true needs of the communities in which they reside?” (p. 24). Understanding why visitors engage with museums, as well as identifying the target audience are imperative to exhibit design. Through case studies at museums around the U.S. and by interviewing museum visitors of varying backgrounds, Falk and Dierking (2016) developed three areas of contextualization: the personal context, the sociocultural context, and the physical context. Each context contributes to visitors' motivations to attend a museum. *Part II: During the Visit* provides more in-depth research regarding museum visitors and exhibitions. Falk and Dierking (2016) suggest, “Too many exhibitions are designed with the assumption that the museum, rather than the visitor, controls the experience. Clearly, exhibitions are and should be designed to engage the visitor in a learning experience that involves her stopping, looking, and making sense of the information presented” (p. 105). They go on to discuss the free-choice learning environment of museums, where visitors choose what and how they experience or learn from exhibitions. Museum planners and exhibition teams must consider not only what information they are presenting, but how it is presented to the public. It is suggested that “...most visitors are drawn to exhibitions that are both visually compelling and intrinsically interesting to them on a personal level” (p. 108). Further, “Visitors find ‘things’ fascinating and most want not only to see things, they want to manipulate them as well” (p. 110). It is suggested that exhibitions provide a “hands-on” experience, as most visitors are drawn to interactive exhibits. They go on to describe this evolution, “... ‘hands-on’ has moved from an esoteric bit of jargon describing a concept invented by the museum community to a familiar term used universally to describe an experience involving direct engagement” (p. 110). Falk and Dierking (2016) support the development of interactive exhibits to better engage all museum audiences.

Interactive Exhibits

Nina Simon's (2010) *The Participatory Museum* considers moving away from traditional, didactic museum models to more immersive, participatory museums. She explains the difference in the two approaches as, "...the way that information flows between institutions and users" (p. 2). She goes on to explain participatory projects: "...the institution supports multidirectional content experiences" (p. 2). Throughout this introduction, Simon (2010) answers three core questions: what does participation look like, who is involved, and how does it work? (pp. 8-29). Participation comes in the form of six categories developed by Forrester Research's social technographics: creators, critics, collectors, joiners, spectators, and inactives (Simon, 2010, p. 8). The diverse types of participation range from the very direct (creators) to the very indirect (spectators). Both visitors and the institution must be involved in participatory aspects. This proves to be difficult for the institution: "Many cultural professionals are more familiar with providing visitor experiences than thinking about how visitors can usefully contribute to the institution" (Simon, 2010, p. 13). Thus, participation is not only the visitor completing prescribed tasks in exhibits, but also contributing unique experiences to enhance the exhibit. The key question to consider in this concept is, "What can visitors provide that staff can't?" (Simon, 2010, p. 13). Finally, in considering how participation works, Simon (2010) developed the "Me to We" participatory model (Figure 2). The five stages move from individual consumption (me) up to individuals engaging with one another socially (we) (p. 26). In several case studies throughout later chapters, Simon shows how these theories work in practice. Chapter Five: "*Defining Participation at Your Institution*" provides further context for how exhibit designers can include interactive displays for audience engagement. Most insightful are the four categories of participation: contributory, collaborative, co-creative, and hosted (Simon, 2010, p. 188). These

categories should be considered when designers are choosing how they want audiences to interact with displays.

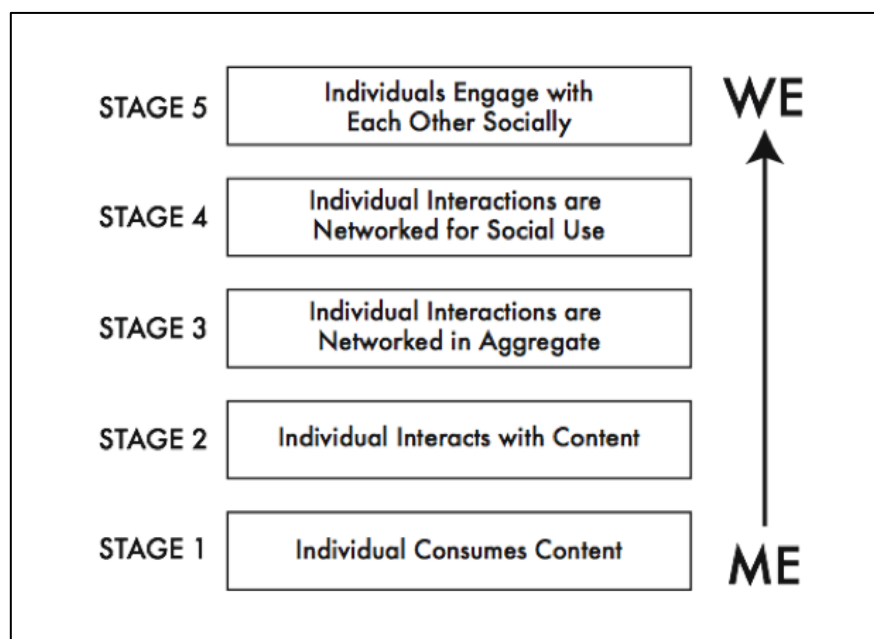


Figure 2 from Nina Simon's *The Participatory Museum*, Chapter 1: Principles of Participation

John Russick's (2010) "Making History Interactive" defines pertinent terms such as interactivity, interactive exhibition, and hands-on activities. These terms and definitions help the reader to understand the world of exhibition design through the lens of interactive displays. Russick (2010) begins by identifying the many different meanings and terms for interactives or hands-on displays. "These terms are often used interchangeably to describe exhibition activities ... whether they are called interactives or hands-on activities, these exhibits invite visitors to do more than simply listen or read or obtain messages. They must act" (Russick, 2010, p. 220). Science and children's museums are the mecca of interactive displays. Russick (2010) explains, "These organizations see interactivity as their primary experience driver and they have a long track record of creating experiential and interactive learning environments" (p. 225). Though it is

expected that science museums provide experiential activities, Russick (2010) makes the argument that history museums are capable of displaying information similarly. He believes that like science museums, history museums need to “...bring people into the process of doing history” (Russick, 2010, p. 226). Further research from the Philadelphia-Camden Informal Science Education Collaborative (PISEC) on what makes an interactive exhibit “family-friendly” delivered seven attributes:

- **Multi-sided** — the family can cluster around the exhibit
- **Multi-user** — interaction allows for several sets of hands and bodies
- **Accessible** — the exhibit can be comfortably used by children and adults
- **Multi-outcome** — observation and interaction are sufficiently complex to foster group discussion
- **Multi-modal** — the activity appeals to different learning styles and levels of knowledge
- **Readable** — text is arranged in easily-understood segments
- **Relevant** — the exhibit provides cognitive links to visitors’ existing knowledge and experience (p. 226).

PISEC’s attributes are a tool that can be used in both exhibition development and creating interactives. Russick (2010) provides other case studies in science museums that utilize interactives displays before considering the challenges of interactive display production in history museums. He states, “The museum...can only approximate them with supporting materials and encourage visitors to use the context created by the exhibition to imagine the history for themselves” (Russick, 2010, p. 231). However, Russick (2010) suggests museum professionals see the limitation as an asset. He continues with examples and case studies of history museums that have included interactivity in their narratives for specific displays. These experiences offer visitors various opportunities to better understand history, and, at the very least, “...visitors gain some insight into the effort needed to understand a life they have not lived” (p. 233). In essence, visitors are able to experience the historian’s challenge, much like the scientist’s challenge to learn through trial and error.

Russick (2010) identifies the challenges most exhibit designers face when considering including interactive displays: “Interactives are noisy; break; are expensive; raise expectations that everything in our museum will be interactive; inspire bad behavior in the kids who come to our museum; and are just fun and games” (p. 236). However, he goes on to offer examples for how museum professionals can choose to respond to these challenges. For example, Russick (2010) offers this advice about when employees are overwhelmed by the noisiness from the use of interactives: “Museum staff must learn to hear the laughter and loud voices of children as active participation in history learning’ (p. 237). Lastly, Russick (2010) suggests reversing the exhibition development process. He concludes, “. . .do not begin by asking what will kids learn. Ask instead what will kids do, and how can we make that activity meaningful” (p. 239).

Though museums are intended to foster learning, they are also institutions for people, regardless of age, cultural background, or socioeconomic background. Russick’s advice drives the inspiration for this research about interactive displays. Museums are capable of providing displays with various levels of visitor input whether the institution has a budget of \$5 million or \$5,000. The only necessary criterion is that museum professionals “make that activity meaningful.”

Chapter 3: Case Studies and Analysis

Introduction

Case studies were conducted at the following sites: the Museum of Natural and Cultural History (MNCH), the Oregon Museum of Science and Industry (OMSI), the Lane County Historical Museum (LCHM), and the Oregon Historical Society Museum (OHS). The case studies are paired by content area to provide a comparison between institutions. The MNCH and OMSI both provide exhibits about science and natural history, while the LCHM and OHS explore the history of Oregon, as well as Lane County. The case studies include observations, photographs, budget and organizational structure reviews, and interviews (all interviewees were given pseudonyms to protect their identities).

Of the many exhibits available to observe at each case study site, the research focuses only on selected permanent exhibits in the museums. Permanent exhibits generally have an average lifetime between 8-10 years and often undergo updates during this period. The lifetime of each interactive is taken into account to better analyze the cost-effectiveness of using computer- or non-computer-based technology in these displays.

Though each institution provides unique interactive displays for their visitors, clear categories for the different types of interactive displays can be found at each site. As previously defined, an interactive is any portion of an exhibit in which a visitor must use one of the five senses (touch, see, hear, taste, or smell) to engage with the exhibit. The research revealed overarching categories with subsets underneath the main categories. Each case study site provided examples of at least one category and subset, as well as combinations of the categories and subsets.

The five main categories are: audio, video, participatory, role-playing, and tactile. **Audio** interactive displays involve listening to something, such as a recorded oral history or ambient sounds in a diorama. **Video** interactive displays prompt the visitor to watch something on a screen. A video interactive might be an interview, a short film, or a visual representation of an activity. **Participatory** interactives ask the visitor to contribute to the exhibit. Visitors may write a response to a question, add a drawing to a sketchbook, or activate an additional experience by selecting an option or pressing a button when prompted. Participatory interactives can remain in the exhibit long-term, or be removed on a daily, weekly, or other terminal basis. **Role-playing** interactives prompt visitors to use their imagination to step into someone or something else's position. Often this means acting as a scientist, a specific animal, or a historical figure. Though role-playing interactives are nearly parallel to participatory interactives, they require separate categories because role-playing does not necessarily add to the exhibit, but is intended to enhance the visitor's experience of the exhibit. Lastly, **tactile** interactive displays invite a participant to manipulate something with his or her hands. Tactile interactives remain the largest of the five categories and range from lifting tabs to reveal answers to questions to touchscreens to games.

Case Studies

Museum of Natural and Cultural History

The Museum of Natural and Cultural History (MNCH) originated in 1935-1936 as the Oregon State Museum of Anthropology and Museum of Natural History. In the 1980s the museum was named the Museum of Natural History. The museum received its current name in 2001, and has remained throughout the state repository for Oregon's publicly owned collections.

The MNCH's mission is "...to enhance knowledge of Earth's environment and cultures, inspiring stewardship of our collective past, present, and future" (About MNCH, 2014). The MNCH also includes accessibility and education in its core values, making interactive displays an essential function to the museum.

The MNCH houses two permanent exhibition halls providing objects and displays about Oregon's natural history—geology, paleontology, and ecology—and cultural history—archaeology and anthropology. Two additional halls in the museum house temporary and featured exhibits (often traveling exhibits). The case study will focus only on the permanent exhibits, *Oregon Where Past Is Present (OWPIP)* and *Explore Oregon (EO)*, as the staff interviewed has the most experience with these exhibitions. Though the MNCH staff works collaboratively in collections, public programming, and exhibits, four main employees develop the displays from conception to fabrication. Two employees, Taylor and Leslie, provided interviews to help better understand the MNCH's organizational structure, exhibition development process, and interactive fabrication. Though the MNCH's total budget is approximately \$1.3-1.4 million, the exhibition department is allocated some \$45,000 for all exhibit development. Both *EO* and *OWPIP* include several engaging, interactive displays.

Taylor and Leslie, two prominent members of the exhibit team, have created dozens of interactive displays while working together over the years. The interactives provide examples of each of the five categories, several of which are a combination of categories. *OWPIP*, the most recently updated permanent exhibit, has both technology-based and non-technology-based interactives. The hall is divided into Oregon's four regions: the Great Basin, the Columbia Gorge, the Coast, and the Western Valley. Each region houses a diorama and an accompanying touchscreen (Figure 1).

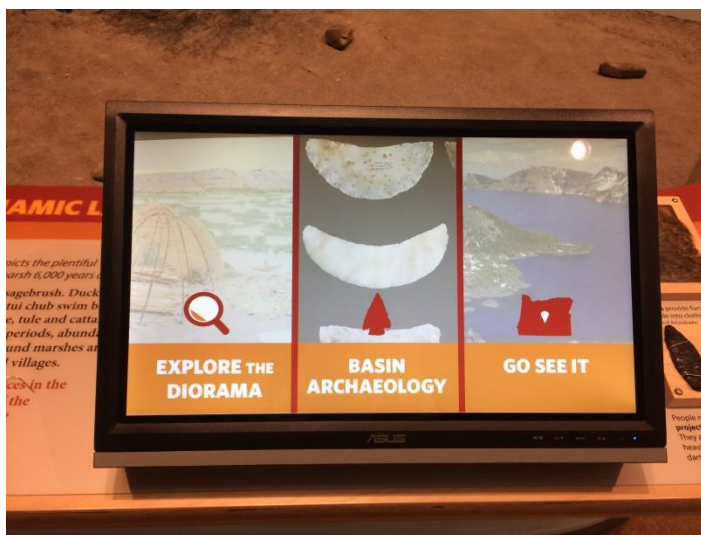


Figure 1: Touchscreen

These touchscreens provide an excellent example of a combination of interactive categories: audio, video, and tactile. Visitors must touch specific parts of the screen to read more about different objects or to watch and listen to a video describing an object. Using touchscreens is a newer method the MNCH has developed in their exhibits. Taylor said, “We have incorporated this method of layering information in the exhibit that is accessible for people, but it’s not blatantly in their face...we don’t have to have this big, bulky label next to the object.” Visitors can choose to explore an object on display more deeply by learning its story, date, or acquisition information, but can also choose to simply admire the object's aesthetic beauty. Leslie explained some advantages to using touchscreens to display information: “It allows us to be flexible so that we can change content, we can continue to add additional content, and it doesn’t really cost us other than the personal time to create the new screen and embed that content...it’s something that allows us to continually build upon that framework.”

The exhibit team tries to incorporate a balance of computer-based and non-computer-based interactives. Taylor said, “We like to have a balance within exhibits: tactile elements,

physical interactives, things you can manipulate, and screens. We don't want to totally go one direction or the other.” *OWPIP* also provides both tactile and participatory interactives to enhance visitor experience and gain a better understanding of Oregon's anthropological past. The tactile opportunities for visitors range from touchable, replicated artifacts (Figure 2) to magnets that can be manipulated by visitors of all ages to create a scene (Figure 3).

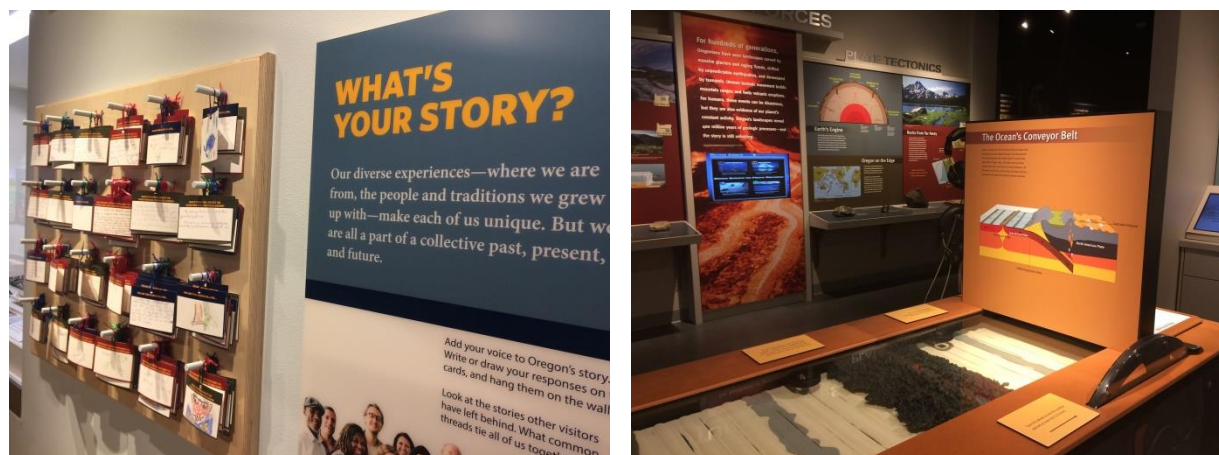


Figures 2 and 3: Replica artifacts (left), Magnet board (right).

The MNCH has incorporated the use of magnets into their interactives more frequently in the recent past. Taylor described the value of using magnets: “They are fun, really simple, easy to produce, [and] easy to replicate in other exhibits, as well.”

In addition to tactile interactives, *OWPIP* offers visitors the opportunity to contribute to the exhibit. In one interactive paired with the replicated plank house, visitors are prompted to draw a picture of their home and who lives with them. The drawings are kept until the sketchbook is filled and replaced. The close of *OWPIP* provides a prime example of a participatory interactive. Visitors are prompted to share a memory or experience related to life in Oregon on a piece of paper with a ribbon tied to the top (Figure 4). These responses are hung on the wall for future visitors to see and continue to build on to the exhibit's original form. The wall

is a focal point for most visitors and each passerby becomes a participant whether by adding to the display or viewing responses.



Figures 4 and 5: Response wall (left), Ocean's conveyor belt (right).

EO, the more dated of the two permanent exhibits, provides video, audio, tactile, participatory, and role-playing interactives for visitors. Video and audio exhibits are generally paired with a participatory or tactile interactive to further enhance visitor experience. One example that includes each of these is the “Ocean’s Conveyor Belt” (Figure 5), which shows how plate tectonics move the ocean floor causing volcanoes and earthquakes. A short video with audio is on one side of the table, while a visual of how the ocean’s floor moves is on the other side. Visitors must rotate a wheel in order for the “ocean floor” to move, causing the landforms to jump similar to how earth reacts during an earthquake.

Another frequently used computer-based technology at the MNCH is found in radio frequency identification (RFID). RFID scanners use radio waves to connect two objects. Most people encounter this technology when checking out a grocery store: a computer scans a tag and

a corresponding price is added to the register. *EO*'s geology exhibit (Figure 6) displays several objects with RFID scanners attached to the bottom. When the object is placed on the red surface, corresponding information about the object is shown on the screen. Leslie explains the benefits to including RFID technology: “[It] incorporates a tactile component for the visitor to look at the object, hold it, and then put it on [the reader] to get a lot more information on [the object].” The tactile, video, and participatory interactive allows visitors to touch artifacts and, if desired, learn more about what the object is, where it can be found, and how it is made. There are some limitations to incorporating computer-based technology in interactives. Taylor described the MNCH’s current challenge: “The only downside to technology is that we, at this point, need an IT (Information Technology) person to work with that material...the RFID scanner and the other programming we had our IT Specialist at the time doing most of that programming.” Many institutions lack an IT Specialist, as the position has yet to be made an essential part of museum work and often requires a high salary.



Figures 6 and 7: RFID Scanner interactive (left), Paleolab (right).

The most popular interactive display at the MNCH is near the close of *EO*. The PaleoLab (Figure 7) combines three categories to create an immersive, highly-engaging interactive.

Visitors assume the role of a scientist (role-playing) by wearing a lab coat and digging for specimens at Oregon's Coast. Once they have chosen their objects (tactile), visitors can weigh, categorize, and place it on the specimen shelf for display (participatory). The PaleoLab is entirely free of computer-technology and requires visitors to use their hands, as well as imagination to bring the exhibit to life.

The MNCH integrates each interactive category seamlessly into their exhibits. Each visitor engages with at least one of these displays during a visit, allowing them to experience the museum's collections on a deeper level. Though the use of computer technology is utilized within several of their interactives, the PaleoLab shows that computer-based technology is not necessary to create an engaging interactive. Leslie summarizes the importance of interactives—with or without computer technology—in museums: “Interactives are a way to engage different senses...visitors can be engaged in different ways so they are continually excited and engaging with the content.”

Oregon Museum of Science and Industry

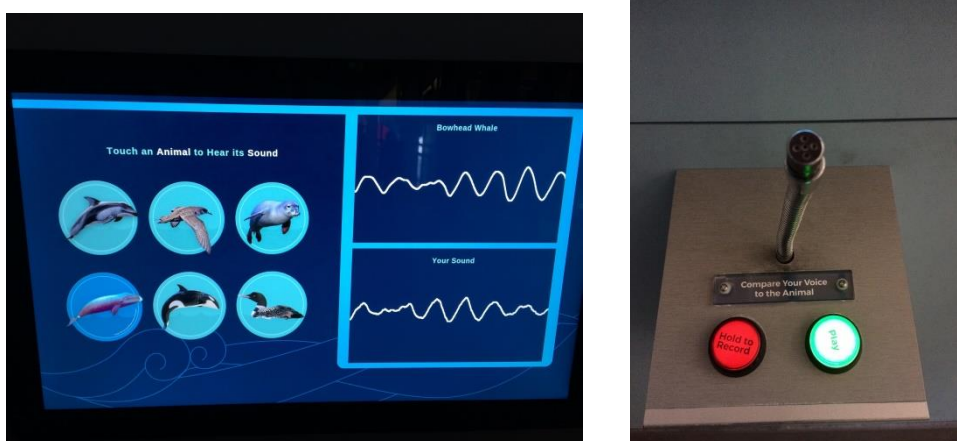
The Oregon Museum of Science and Industry (OMSI) originated in the mid-forties as a planetarium in the home of a Portland businessman, Ralph Lloyd. Like many museums in the U.S., OMSI has outgrown numerous buildings over the decades and currently resides on the site of a former power-generation plant along the Willamette River. The organization's mission is to “inspire curiosity through engaging science learning experiences, foster experimentation and the exchange of ideas, and stimulate informed action” (History and Mission, 2017). OMSI's vision includes developing integrative education using science, technology, and design. The emphasis of these values can be witnessed throughout the five exhibition halls, classroom labs, and planetarium.

The focus of this case study will include exhibits from the *Life Hall*, featuring displays about natural and life science, and the *Turbine Hall*, showing displays about physics, renewable energy, and technology. OMSI has a large staff in departments of education, exhibit design, research, visitor services, food services, and administration, as well as hundreds of volunteers. OMSI is also unique in its 2015 operating budget of nearly \$19.5 million, \$15 million of which was dedicated to programming and exhibits (History and Mission, Annual Report, 2016). It comes as no surprise that OMSI is capable of creating hundreds of interactive science displays that reach learners of all ages.

As often found in science and children's museums, nearly all of OMSI's displays are interactive and fall under one or more of the five categories. *Our Ocean*, one of the most recently fabricated exhibits in the *Turbine Hall*, combines science, art, and interactive displays for families and children to explore the earth's oceans. One display allows visitors to manipulate the topographical elements of the ocean floor by using projected maps and a sandbox. As participants move the sand through the box, the projection changes to reflect the elevations of the sand. Visitors can also try to recreate the ocean floor that is displayed on another screen by moving sand to specific elevations and sections in the sandbox.

Another participatory display can be found near the close of *Our Ocean*. Visitors are invited to read a prompt and write or draw a response on a card. They are given the option to display their card on the wall or place it in a sealed box. Guests are able to comfortably add to the display either privately or publicly. The integration of art into science-themed exhibits provides more opportunities to engage a broader audience, and provides a simple, easily maintainable interactive.

A final example from *Our Ocean* combines all five of the interactive categories. The “Animal Sounds” display (Figures 8 and 9) requires a participant to listen to an ocean animal sound by touching the screen (audio, video, tactile). Next, when a button is pressed and a participant speaks into the microphone, a recording of an imitated animal sound is made (participatory, role-playing, tactile). Finally, the visitor can look at his/her sound waves compared to the animal sound waves, as well as listen to his/her recording compared to the animal sound (audio, video, participatory). What seemed like a complex computer-based interactive took only one to two minutes to complete the full cycle, making it simple and fun to use.

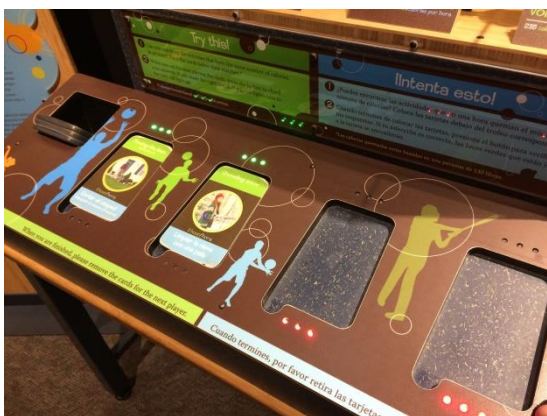


Figures 8 and 9: Video screen (left), Microphone and recording buttons (right).

The *Life Hall* houses older exhibits, but maintains OMSI’s high level of interactivity. Several games, touchscreens, and response-driven activities can be found throughout the hall. Many games about health and nutrition use RFID technology, similar to that used at the MNCH. In one game (Figure 10), a participant must match activities that burn the same amount of calories as those shown in the display by placing a card into the corresponding space. Once the spaces are filled, the participant presses a button to reveal correct and incorrect answers. In

another game, participants can scan different food items found in a supermarket to learn about each item's nutritional value. Each participatory and tactile interactive game builds upon a larger exhibit housed in the hall, allowing visitors to enhance their experience.

A final set of interactives that can be found throughout OMSI's exhibit halls are "Brainteaser Tables" (Figure 11). Each table holds tactile puzzles with instructions and images of expected end products. The puzzles are made from simple materials like wooden blocks, string, metal tools (like nails or screws), and/or objects molded from plastic (like cylinders or squares). Whether it was the accessibility to visitors of all ages, the ease in manipulating the objects, or the satisfaction of solving a difficult puzzle, it was clear that the Brainteaser Tables were among the most popular interactives in the entire museum. The tables were consistently populated with visitors trying to solve each puzzle.



Figures 10 and 11: RFID game (left), Brainteaser table (right).

Because OMSI's main audience is children and families, the plethora of interactive exhibits comes as no surprise. Both computer-based and non-computer-based technologies are utilized to provide hands-on, interactive experiences to their visitors. Though disguised as a game, the displays allow participants to learn more about science-based subjects like physics,

biology, or oceanography through immersive experiments and activities. Visitors are invited to use their hands, imaginations, and problem-solving skills throughout the museum.

Lane County Historical Museum

Though the Lane County Historical Society was established in 1935, it was not until 1951 that the Lane County Historical Museum (LCHM) was created. Local hero Cal Young founded and operated the LCHM in during its first few years. The history museum collects, preserves, and displays artifacts relevant to Oregon and pioneer history dating back to the 1800's. LCHM's mission is "...to collect and preserve artifacts and library materials that help establish or illustrate the history of Lane County" (Our Mission, n.d.). The small staff of seven employees along with many volunteers and interns works in areas of curating, collections, education, administration, and visitor services/development.

The two-story building houses both permanent and temporary exhibits developed by the on-site exhibits curator. The museum is currently showing two temporary exhibits, *Uprooted: Japanese American Farm Labor Camps During World War II* and *Lost Towns: Revisiting Logging Communities*, and two permanent exhibits, *A History of the Lane County Courthouse* and their *Vehicles and Transportation* collection. LCHM is limited in exhibition content because of its mission, and the severely limited storage space that prevents the museum from accepting artifact donations. LCHM's budget was \$3,000 in FY 2014-2015, \$5,000 in FY 2015-2016, and is currently \$13,000 for FY 2016-2017. Though the exhibits budget has steadily increased between 2014 and 2017, it is still minimal.

LCHM provides two different interactive displays for visitors. A witness stand (Figure 12) in the *A History of the Lane County Courthouse* exhibit allows visitors to sit in a courthouse witness stand and imagine what it may have been like to be a witness in a Lane County court

hearing. The role-playing interactive may originally have been considered a simple photo opportunity, but is truly an engaging, immersive experience. The second interactive display invites younger visitors to role-play with tactile costumes, props, and puppets (Figures 13 and 14). Pioneer-era clothing like bonnets and bucket hats are available to wear, along with a small staged area for imaginatively play. The dress-up area provides children with the props to imagine arriving in Oregon in a covered wagon and living in Lane County during Pioneer times. The puppets allow visitors to envision different characters throughout Lane County's history. A booklet with a picture of the puppet, its name, and a specific era (i.e. 1960's or 1980's) sits on a bench in front of the staged area.



Figures 12, 13, and 14: Witness stand (left), Costume area (center and right).

LCHM has no computer-based exhibits, let alone computer-based interactives. The museum is likely dissuaded from adding software or computer technology to their exhibits because of the small budget, as well as absence of an IT professional on staff. It must be noted, though, that LCHM has the capability to develop additional interactives to meet their financial

and institutional needs. Many ideas and concepts can be borrowed from other history-based museums in the state and across the nation, especially from Oregon Historical Society.

Oregon Historical Society

The Oregon Historical Society (OHS) was established in 1898 to make Oregon's history visible and accessible to all. Their mission is "to preserve the state's history and make it accessible to everyone in ways that advance knowledge and inspire curiosity about all the people, places, and events that have shaped Oregon" (Mission and Vision, 2017). OHS continues to research and explore Oregon's history, and offers its existing resources to the community through a museum, as well as a library.

Visitors can explore three stories of traveling and permanent exhibits at the OHS museum. The permanent exhibits the case study will analyze are *History Hub*, *Oregon My Oregon*, and *Oregon Voices*. Each exhibit features historical artifacts and figures important to Oregon's heritage and culture. OHS's 2015 operational budget is \$9.8 million, which nearly \$4.7 million is used for program services. Program services at OHS include research, education, and exhibits (Annual Report, 2016).

OHS does not depend on grants or contributions for exhibition development. Julian, a curator of exhibits at OHS, explained in the interview: "Most of the exhibits are self-funded. We don't get a lot of grants for our exhibits." Considering OHS develops exhibitions out-of-pocket, the number of interactive displays throughout the museum is impressive. *Oregon My Oregon*, the oldest of OHS's permanent exhibits, uses audio, video, and tactile interactives to enhance visitor experiences. Ambient sounds and recorded oral histories greet visitors as they enter the exhibit. Because it features Oregon's history, the focus of the exhibit falls to their vast collections of historical artifacts. In addition to the looped audio playing overhead, visitors can enter a theater

to watch a 9-minute video about exploration and map-making from the 17th-19th centuries. One tactile and role-playing display (Figure 14) offers children the opportunity to dress up like an early explorer and camp in a small bunk attached to the wall. The final display in *Oregon My Oregon* features a 1950's diner scene where visitors can sit and select videos from a jukebox to watch on a large screen (Figure 15). The imaginative role-play of sitting in a diner along with the tactile action of pressing buttons to choose a video to watch integrates the most interactive categories in the entire exhibit.



Figures 14 and 15: Role-playing (left), Video diner (right).

On the other hand, the newer permanent exhibits, *Oregon Voices* and *History Hub*, deliver an entirely different interactive experiences to visitors. *Oregon Voices* interactives are highly participatory, and include video, audio, tactile, and role-playing categories. When asked how their designers develop their interactives, Julian said, “Ideas come from all over...research, consultants, the advisory board, game shows and arcades, other museums...they come from everywhere!” Touchscreens and videos can be found throughout the exhibit highlighting important figures and objects from Oregon’s history. A participatory interactive can be found in the rear of the exhibit, where visitors are asked to write a response about their favorite place in

Oregon on a sticker. The participant then places the sticker in the location on a large board shaped like the state (Figure 16). This simple activity allows visitors to bring their personal experiences into the display and help develop the exhibit over time. Because of the long lifetime of the vinyl stickers, guest responses will remain on the wall until another response is placed in front of the original, or it is removed from the exhibit.



Figures 16, 17, and 18: Oregon response board (left), script (center), and costumes (right).

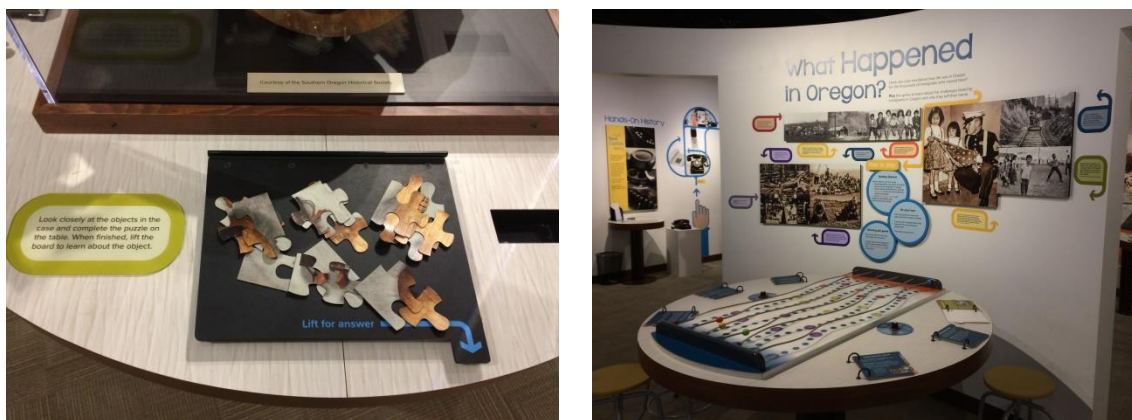
Another unique approach to interactives in the history museums is from the “Reader’s Theater,” a stage with costumes and scripts (Figures 17 and 18) in *Oregon Voices*. Visitors are able to participate by role-playing or as an observer in the performance-based interactive. The two different scripts offer unique perspectives of actions like gentrification and the Celilo Falls dam that affected minority populations in Oregon. Participants are able to learn about these historical events by not only reading about them, but also participating in a living history demonstration. This is the only example of a performance-based interactive in the case studies.

History Hub also provides several hands-on, participatory interactives geared towards K-12 students. The exhibit’s mascot, Sunshine, appears on the walls throughout the exhibit. He takes visitors on a journey to explore Oregon’s diversity in people and communities. The exhibit

resembles a classroom more than a history display, which plays into OHS's education goals. Julian said, "Our exhibits' main focus is to educate people about stories about Oregon's history and the present diversity of voices found here." Most activities provide touchscreens with video and audio for further exploration of topics, tactile objects to manipulate to better understand concepts, and paper and writing utensils to respond to prompts or write reflections about each experience. Like many museums, OHS is able to hire outside consultants to develop several of their computer-based interactives. Julian said, "We mostly work with Sticky, Co. out of Portland...they do a lot of our software...they come up with a lot of our interactive ideas."

Often associated with student learning is the integration of educational games. OHS includes several games in their interactives to facilitate further understanding and learning. A magnet puzzle of an object (Figure 19) allows visitors to complete a task prior to learning more about the subject. A more complex board game (Figure 20) walks participants through a first-hand experience on the Oregon Trail.

It is clear that OHS is receptive to the changes present in society. The exhibition team develops interactives both independently and with the assistance of other experts. Their collaboration proves to be successful in that include both computer-based and non-computer-based technologies. As Julian mentioned, "[Exhibits] have a variety of high-tech and low-tech interactivity...from software-driven activities to physical, manual interactive." This variety provides different levels of engagement and interactivity in OHS's exhibits.



Figures 19 and 20: Magnet puzzle (left), board game (right).

Analysis

The case studies offer several examples of each interactive category. The content area and intended audience of each museum did not seem to affect the exhibition staff's ability to develop unique, meaningful interactive displays. Whether displaying science or history objects, or focusing on elementary or college students, each case study site integrated some level of interaction for their visitors. It is also clear that each museum is progressing towards a visitor-centered, interactive model of exhibition design. Older exhibits (developed between 2000-2010) are generally centered on collections with accompanying audio, video, and tactile interactives, while newer exhibits (developed between 2011 and the present day) focus on hands-on, participatory interactives. Limitations came in the form of budget, space, time, and staffing.

OMSI's \$15 million budget for programming and exhibits likely allocates most exhibit funds to temporary, blockbuster exhibits and maintenance of their existing displays. Of the hundreds of interactives in both the *Turbine Hall* and *Life Hall*, perhaps a dozen were installed in the past five years. If funds are not used to create and develop new exhibits, it can be concluded that they are being used to maintain existing displays. When looking at the MNCH, it is clear

that their \$45,000 budget is allocated towards updating and maintaining their exhibits, as well as hosting temporary exhibits. Though *Explore Oregon* has not undergone recent renovations like *Oregon Where Past Is Present*, the exhibition team has updated audio and video displays to reflect current collections and research discoveries. Regardless of the marked difference in both physical space and financial standing of MNCH and OMSI, the two museums offer comparable interactives: touchscreens, RFID scanners, art-based visitor reflections and responses, and labs/experiment-based activities.

Both the MNCH and OMSI are examples of how computer-based technology enhances interactive displays, answering the question of whether or not interactives require computer-based technology. The simple software and durability of RFID scanners make them easy to integrate into a display, and maintain them over the lifetime of an exhibit (generally between 8-10 years). Touchscreens prove to be not only easily manipulated by the vast majority of visitors, but also act as a convenient and sustainable method for displaying labels for objects. Unlike mounted labels, touchscreen labels can be frequently updated, revised, or edited to reflect changes in research or availability of objects on display without wasting additional materials. This proves to be especially useful for the MNCH because it acts as the state repository for publically owned collections. For example, the touchscreen software can be updated quickly and easily if an object on display is removed for research or conservation, or lent to another institution.

The MNCH offers similar interactive displays and experiences to those of OMSI, despite OMSI's larger budget, bigger staff, and ample industrial space. Both museums show that while computer-based technology is not necessary for creating interactives, affordable, easy-to-use software can enhance displays and make collection updates timely and convenient. Each site

shows that interactives should be sustainable, easy to maintain, and should remain relevant over a ten-year span.

When comparing OHS and LCHM, they have a few similarities in content area and organizational structure. Their differences in space, staffing, and financial support directly affect how their exhibitions are developed. OHS's larger budget allows the museum to explore more options when developing exhibits and interactives, including hiring outside consultants to offer their expertise and manufacturing skills in computer-based interactives. LCHM is also limited to a small warehouse-like space with a smaller second-story loft space. Many large artifacts, including a covered wagon and other vehicles, occupy much of the main space, which leaves little opportunity for creating additional exhibits with interactives.

Although LCHM faces many limitations, there are ample opportunities to think outside of the box, as well as borrow interactive ideas from OHS. The non-technology-based interactives found at OHS can be easily replicated or reimaged with simple materials and little expense. For example, LCHM could create an interactive response board where visitors share their favorite thing about or place in Lane County. With options spanning from the Pacific Coast to the Cascade Mountains, visitors could respond in a plethora of ways. The exhibition designer would only need a blank wall, a mounted label with instructions, writing utensils, and response cards. The large number of volunteers involved with LCHM could donate these supplies or they could be purchased at a low cost from budget stores.

OHS has evolved with the progression of visitor-based needs in museums, while LCHM could consider other options for how their topics are presented to the public. LCHM's witness stand could easily include either a mounted label with leading questions or a short script. With this addition, the display could go shift from a quick photo opportunity to an engaging, living

history experience. Both museums have fascinating collections that audiences are interested in seeing and learning about. Similar to the other case studies in this research, it is not so much about how the information is presented, but how the activity involves the visitor. Whether or not computer-based technology is utilized for interactives, visitors want to know what is being asked of them and how they can contribute to their museum experience.

Chapter 4: Recommendations and Conclusion

Recommendations

The following includes recommendations for how museums can incorporate interactives into their exhibits, as well as areas for future research. The suggestions are for both small and large museums that would like to include more interactive displays in their exhibits. The suggestions are divided into non-computer-based and computer-based interactives. Each museum has different needs, audiences, and content that only those working within the institution can understand. These generalized recommendations are meant as a guide, not a rulebook. Ultimately, a museum's administration must make the choices that are best for fulfilling their mission, goals, and visitor needs.

Non-computer-based Interactives

Some museums may be more inclined to include non-computer-based interactives in their exhibits, because of a lack of funding and/or staffing to support software and programming. For these institutions, I recommend including tactile, participatory, and role-playing interactives. The observations at each case study site revealed that games, objects that could be manipulated, and props and dress-up opportunities were among the most popular subsets of interactives. These interactives were successfully executed because they had a clear purpose in the exhibit, yet allowed visitors to interpret their use independently.

Museums, regardless of size or financial standing, can easily incorporate these various activities into their displays. Gameplay should take between 3-5 minutes and should be able to be completed individually or as multi-player. Additionally, problem-based games, though seemingly entertaining, can better connect visitors with the exhibits and collections. Dress-up

and props also need to have a purpose within an exhibit. As opposed to placing a basket of costumes in an area, the interactive may direct visitors to dress as a specific person from history or from a specific profession. Providing a script similar to that found in Oregon Historical Society's *Oregon Voices* provides participants with an objective to perform, but allows them freedom to produce an entire play or read a short scene from the script while in costume.

Computer-based Interactives

As mentioned in the case study analysis, computer-based interactives also provide visitors with an engaging experience. However, it is necessary to consider your own and other museum staff and volunteer skillsets. Although, it is necessary to have an IT specialist or consultant available to maintain these technologies, there are programs available that are relatively easy to program and run in-house.

Raspberry Pis, a very small computer device, and RFID scanners are the most complex of the computer-based technologies introduced in the research. Both require programming skills, but allow flexibility in adding or revising content in exhibits. RFID scanners range from \$500-\$2,000 for equipment, while a Raspberry Pi can cost between \$10-\$50. The sustainability and affordable price of both software devices may make the maintenance needs from an IT professional worth it.

Another simple software suggested by the exhibition specialists interviewed in the research is BrightSign. BrightSign is a computer application that allows users to compile videos into one device and may be activated by a visitor who pushes a button on the device. The technology is easy to access and user-intuitive, making it unnecessary to hire an IT specialist to maintain. BrightSign may be a more affordable, user-friendly option for including video technology in interactive displays.

Future Areas of Research

The research was unable to answer one sub question: how can interactives be replicated for outreach or classrooms? The success of interactive displays in exhibits can be extended to broader audiences through community and classroom outreach, and through loans or gifts to other museums. As each interviewee mentioned, many ideas come from other institutions. Compiling these common interactive ideas into one place can act as an additional guide to this research.

The conclusion of this research also raises additional questions. The most prominent question being, what is the next step in the evolution of exhibits and/or interactives? Museums moved from being research and object-centered to being visitor-centered over the past century. More recently, museums have more clearly defined the meaning of “visitor-centered” and developed more opportunities for visitors to take an active role in exhibit elements. Understanding upcoming and future trends in audience needs will help museums to be innovative and remain relevant in our continually shifting climate.

Summary of Findings

The research answered many of the original questions and sub questions presented in the first chapter of this project. Below are detailed responses to the questions posed, as well as further qualifying data. Through literature review, case studies, observations, and interviews, it became clear that interactives are a useful method for presenting information to museum visitors.

What makes a display interactive?

As defined in the first chapter, an interactive display is any portion related to an exhibit in which a visitor must use one of the five senses (touch, see, hear, taste, or smell) to engage with the exhibit. Most exhibits at the case study sites included some form of interactivity. However, there are two clear interactive methods: passive and active. A **passive** interactive does not result in any observable actions. For example, a visitor can sit down to watch a movie, but an observer will not be able to determine if the visitor is listening to and watching the video or thinking about his/her grocery list. An **active** interactive clearly prompts observable behaviors. For example, a visitor must tap a section of a touchscreen or move a lever to reveal more information about a topic. The more recent occurrence of active interactives could be in part due to the evolution of technology, as well as its ease in availability both physically and financially. When comparing exhibitions from within a single site, it was clear which was more recently updated. For example, OHS's *Oregon My Oregon* offered more passive interactive displays such as audio recordings of ambient sounds and theater-style videos. On the other hand, *Oregon Voices* allowed visitors to take more active roles of participation by contributing to displays or manipulating tactile interactives.

What types of interactive displays are typically found in science and history museums?

As described in the previous chapter, there are five categories of interactives: **audio**, **visual**, **tactile**, **participatory**, and **role-playing**. The research also revealed the role interactives play in the presentation of content. Each case study showed that interactives are essential, enhancing, and/or entertaining. An **essential** interactive is a display that must be utilized to understand the topic presented. Without an essential interactive, visitors will not understand the

presented content. For example, a picture of an object on a touchscreen must be touched in order to read the label associated with it. An **enhancing** interactive allows the visitor to independently explore additional content or provide better understanding through an experience. For example, a label can describe a scientific theory (gravity) and then an enhancing interactive will allow the visitor to test out the theory (holding a ball in the air and letting it go). Finally, an **entertaining** interactive is a display that can be understood and completed without information from an existing display. This allows the visitor to participate freely without the necessity of reading labels or making connections with other content. The visitor is able to have an experience that he or she could apply to future experiences. Whether essential, enhancing, entertaining, or a combination of the three, a participant's experience is heightened and allows them to connect with the museum's collections and displays.

Is it necessary for interactive displays to include technology?

Technology is seemingly both necessary and unnecessary. It has become an expectation for technology to be present in museum exhibits because it plays a prominent role in the average museum visitor's life. In addition, technology provides the opportunity to quickly and easily update information in displays. Newly acquired data or artifacts can be added to the database for visitors to view or photos of a current excavation site can provide visitor's an "inside experience" to the research aspect of museum work. Each day new technological advances and less expensive devices become available for purchase. Paired with more user-friendly options, this makes it simple for any museum to provide interactives requiring some level of computer technology. On the other hand, many museums are limited by their budget. In these cases, non-computer-based technologies are just as easily available to exhibition designers. Though visitors

seemingly appreciate computer-based interactives, their museum experience can be equally meaningful and engaging without it.

These different types of interactives and interactive styles can be utilized in both small and large museums. With simple, sustainable materials, exhibit designers and other museum staff can create interactives on a small budget. In addition to recommending how museums can include both non computer- and computer-based interactives in their displays, there are suggested areas of additional research to explore.

Appendix A Research Timeline

January 2017

1. Case study site visits (Eugene)
 - a. Museum of Natural and Cultural History
 - b. Lane Historical Society
 - c. Begin case study analysis writing
2. Interviews
 - a. Send emails to all potential interviewees
 - b. Schedule interviews with respondents
3. Continued review of literature

February 2017

1. Case study site visits (Portland)
 - a. Oregon Historical Society
 - b. Oregon Museum of Science and Industry
 - c. Continue writing case study analysis
2. Interviews
 - a. Conduct scheduled interviews
 - b. Contact potential interviewees by telephone to schedule interviews (if able)
 - c. Continue to schedule interviews
 - d. Transcribe interviews for documentation
3. Document analysis
 - a. Begin analysis of documents collected from interviews and site visits
4. Continue review of literature

March 2017

1. Case study site visits
 - a. Revisit any sites where further documentation is needed
 - b. Continue writing case study analysis
2. Interviews
 - a. Conduct scheduled interviews
 - b. Transcribe interviews for documentation
3. Document analysis
 - a. Continue document analysis of collected materials
4. Complete review of literature

April 2017

1. Case studies
 - a. Continue writing case study analysis
2. Interviews
 - a. Complete all interviews
 - b. Complete transcription of interviews
 - c. Analyze responses
3. Document analysis

- a. Complete document analysis
- b. Begin comparison of documents
4. Submit first draft of research chapters (4/21)

May 2017

1. Revise research document
2. Clarify any areas that lack data or information
3. Present final research (5/19)
4. Submit full draft of research document (5/26)

June 2017

1. Complete final research document (6/6)
- Submit online file to UO Scholars Bank (6/6)

Appendix B
Research Instruments

Case Study Site Visit Observation Outline

- I. Museum Site Information
 - a. Name
 - b. Location
 - c. Content area
 - d. Audience

- II. Organizational Structure
 - a. Mission
 - b. Goals
 - c. Vision
 - d. Procedures
 - e. Policies
 - f. Budget
 - g. Departments
 - i. Paid staff within departments

- III. Exhibit
 - a. Content area
 - b. Collections/Objects
 - c. Interactive displays
 - h. Description of each

- IV. Photographs
 - a. Exhibits
 - b. Interactive displays
 - c. Exterior of site

Semi-structured Interview Questions

1. What percent or amount of your organization's/museum's budget is allocated for exhibitions?
2. Tell me about the role education plays in your mission, goals, and values of your organization/museum.
3. What are the policies and procedures in place when developing interactive displays in exhibitions and/or in educational programming?
4. What role does technology play in the development and creation of interactive displays?
5. What is the average lifetime of an interactive display in your organization/museum?
6. In your opinion, tell me about the best interactive display your organization/museum has ever created.
7. Are there any documents or resources you can give me or suggest to gain a better understanding of your organization/museum policies, procedures, and purpose?

Document Analysis Outlines

Organizational Structure

	Mission	Vision	Goals	Policy	Procedures
Common terms/phrases					
Relates to education					
Relates to visitor experience					
Relates to other aspect of exhibition development					
Relates to overall purpose of museum					

Document Analysis Outlines

Budgets

	Site #1	Site #2	Site #3	Site #4
Total Budget				
Allocation of budget to exhibit development				
Other allocations related to exhibit development				
Total spent on exhibits in FY 2014-2015				
Total spent on interactive displays in FY 2014-2015				
Total spent on exhibits in FY 2013-2014				
Total spent on interactive displays in FY 2013-2014				

Appendix C
Recruitment Instruments

Recruitment Email

Dear [*insert name*],

My name is Baylie Stillwell and I am a graduate student from the Arts & Administration Department at the University of Oregon. I am writing to invite you to participate in my research study about interactive display development for exhibitions in science and history museums. You're eligible to be in this study because you are a paid staff member at [*insert institution name*] in the [*insert department name*]. I obtained your contact information from the [*insert institution name*] website at [*insert web address*].

If you are willing to participate in this study, you will be interviewed for 30-60 minutes about your experience in developing, creating, and evaluating interactive displays that augment or enhance an exhibition. I would like to audio record your interview. The information will be used to determine best practices and provide recommendations to other museums interested in building interactive displays on a budget.

Please remember, this is completely voluntary. You can choose to participate in an interview or decline. If you'd like to participate or have any questions about the study, please email me at baylies@uoregon.edu or call me at 985.373.6605.

Thank you for your time and attention.

Best regards,

Baylie Stillwell
M.S. Arts Management Candidate
University of Oregon
985.373.6605
baylies@uoregon.edu

Verbal Recruitment Script

Hello - My name is Baylie Stillwell and I am a graduate student from the Arts & Administration Department at the University of Oregon. I'm calling to ask if you would be interested in participating in a research study I am conducting. This is a study about interactive display development for exhibitions in science and history museums. You're eligible to be in this study because you are a paid staff member at [*insert institution name*] in the [*insert department name*]. I obtained your contact information from the [*insert institution name*] website at [*insert web address*].

If you are willing to participate in this study, you will be interviewed for 30 minutes to an hour about your experience in developing, creating, and evaluating interactive displays that augment or enhance an exhibition. I would like to audio record our interview. The information will be used to determine best practices and provide recommendations to other museums interested in building interactive displays on a budget.

Please remember, this is completely voluntary. You can choose to participate in an interview or decline. If you'd like to participate, we can go ahead and schedule a time for me to meet with you to give you more information. If you need more time to decide if you would like to participate, you may also call or email me with your decision.

Do you have any questions for me at this time?

If you have any more questions about this process or if you need to contact me about participation, I may be reached at 985.373.6605.

Thank you so much for your time!

Appendix D
Consent Form for Adults

University of Oregon Department of Arts & Administration
Informed Consent for Participation as a Subject in Interactive Display Development Study
Investigator: Baylie Stillwell
Adult Consent Form

Introduction

- You are being asked to be in a research study of interactive display development for exhibitions in science and history museums.
- You were selected as a possible participant because you are a paid staff member in an education, public programming, or exhibition department at a case study museum site.
- We ask that you read this form and ask any questions that you may have before agreeing to be in the study.

Purpose of Study:

- The purpose of this study is to understand the best practices and recommendations for how to develop interactive displays for exhibits with a small budget.
- Participants in this study are from the greater Eugene and Portland, Oregon areas.

Description of the Study Procedures:

- If you agree to be in this study, we would ask you to do the following things: participate in a 30-60 minute interview that is audio recorded.

Risks/Discomforts of Being in the Study:

- The study has the following risks. First, you may not be willing to share certain information about the organizational structure of your museum. In the unlikely event that you are unable to answer a question, it will be skipped in the interview process. Second, you may be unable to provide confidential information about the policies, procedures, or budget allocations in your museum. You are free to withhold any confidential information to protect your job security.
- This study may include additional risks that are unknown at this time.

Benefits of Being in the Study:

- The purpose of this study is to understand the best practices and recommendations for how to develop interactive displays for exhibits with a small budget.
- There are no significant individual benefits expected in this study.

Costs:

- There is no cost to you to participate in this research study.

Confidentiality:

- The records of this study will be kept private. In any sort of report we may publish, we will not include any information that will make it possible to identify a participant. Research records will be kept in a locked file.
- All electronic information will be coded and secured using a password-protected file. The research investigator is the only person who will have access to the audio recordings made in the process. All audio files will be destroyed once the study is complete.
- Access to the records will be limited to the researchers; however, please note that the Institutional Review Board and internal University of Oregon auditors may review the research records.

Voluntary Participation/Withdrawal:

- Your participation is voluntary. If you choose not to participate, it will not affect your current or future relations with the University.
- You are free to withdraw at any time, for whatever reason.
- There is no penalty or loss of benefits for not taking part or for stopping your participation.
- *You will be provided with any significant new findings that develop during the course of the research that may make you decide that you want to stop participating.

***Dismissal From the Study:**

- The investigator may withdraw you from the study at any time for the following reasons: (1) withdrawal is in your best interests (e.g. side effects or distress have resulted), (2) you have failed to comply with the study requirements, or (3) the study sponsor decides to terminate the study.

Contacts and Questions:

- The researcher conducting this study is Baylie Stillwell. For questions or more information concerning this research you may contact her at 985.373.6605 or via email at baylies@uoregon.edu.
- If you believe you may have suffered a research related injury, contact Baylie Stillwell at 985.373.6605 who will give you further instructions.
- If you have any questions about your rights as a research subject, you may contact: Research Compliance Services, University of Oregon at 541.346.2510 or ResearchCompliance@uoregon.edu

Copy of Consent Form:

- You will be given a copy of this form to keep for your records and future reference.

Statement of Consent:

- I have read the contents of this consent form and have been encouraged to ask questions. I have received answers to my questions. I give my consent to participate in this study. I have received (or will receive) a copy of this form.

Appendix E Resume

BAYLIE STILLWELL

985.373.6605 | baylies@uoregon.edu | 35 Lawrence St. #3 Eugene, OR 97401

EDUCATION

*Master of Arts: Arts Management
Certificate: Museum Studies
University of Oregon
Expected graduation: June 2017
GPA: 4.00*

*Bachelor of Arts: Music Education
Teaching Certification: K-12 Vocal Music, Level 1-
517584
Southeastern Louisiana University
Graduated: Dec 2011
GPA: 3.45*

LEADERSHIP AND VOLUNTEER

First-Year Representative:

- AAD Student Advisory Group (Dec 2015-present)

Vice Chair:

- Jordan Schnitzer Museum of Art Student Advocacy Council (Sep 2015-present)

Volunteers:

- Louisiana Children's Discovery Center (Dec 2010-Jun 2011)
- Project Step-Up (Jan 2008-Dec 2010)

TECHNICAL SKILLS

- Microsoft Office Suite (Excel, Outlook, PowerPoint, Publisher, Word)
- Adobe Photoshop, Adobe In-Design, Adobe Illustrator
- Finale Music Notation

MUSEUM EXPERIENCE

*Graduate Laurel Award Intern
Museum of Natural and Cultural History; Eugene, OR (Apr. 2016-Jun. 2016)*

- Develop, create, lead, and evaluate monthly, PreK "Little Wonders" program.
- Create visual resources to accompany Little Wonders programming.
- Develop, create, and evaluate programming for tri-annual Family Day programs.
- Cultivate and sustain community and university-based partnerships to support Family Day programming.

Volunteer Coordinator

Jordan Schnitzer Museum of Art; Eugene, OR (Jan 2016-present)

- Prepare, organize, and manage materials, recruitment, shift schedules, and communication plans prior to events.
- Oversee up to 15 volunteers throughout events, ensuring volunteers feel welcomed, informed, empowered, and appreciated.
- Evaluate event by writing reflection and sharing ideas for the future.

Intern

Smithsonian Institution Traveling Exhibition Service; Washington, D.C. (Jun. 2016-Aug. 2016)

- Independently researched topics to be included in upcoming traveling exhibit.
- Networked with various Museum on Main Street host sites to complete case studies.
- Worked independently to cultivate potential partnerships with rural creative placemaking proponents across the U.S.

Toddler Time Coordinator/Playologist

Louisiana Children's Discovery Center; Hammond, LA (Jun 2010-Dec 2012)

- Planned, organized, and implemented weekly lessons with groups of up to 10 toddlers aged 1-4 years.
- Curated learning displays for weekly, themed lessons.
- Managed, assisted, and evaluated teacher candidate volunteers and junior volunteers for education programs and activities.
- Performed oral educational presentations to groups 15-35 museum visitors.
- Provided excellent customer service tailored to the needs of diverse groups of students and teachers in high volume environment.

TEACHING EXPERIENCE

General Music and Chorus Teacher

St. Tammany Parish Schools; Folsom, LA (Aug 2013-Jul 2015)

St. Charles Parish Public Schools; Destrehan and Norco, LA (Dec 2012-May 2013)

- Pioneered the creation of extra-curricular chorus classes of up to 50 students at the elementary and junior high level.
- Created organizational system by cataloguing choral music libraries of up to 300 pieces.
- Collaborated with colleagues and volunteers to coordinate educational programs for national commemorations and holidays.
- Planned, taught, and assessed music classes for grades K-8 of up to 26 students at elementary and junior high schools

GRANT WRITING EXPERIENCE

Volunteer Grant Writer

Springfield Museum; Springfield, OR (Apr 2013-Aug 2014)

- Organized, wrote, and proofread grants for nonprofit history museum.
- Assisted in completion and awards for multiple grants.
- Independently completed and obtained grant for over \$1,000 per month in advertising.

References

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