SIKES, KATHRYN MARIE, M.S. Making Your Own Meaning: Designing Constructivist Interactive History Exhibits. (2012)
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History museums today face a dilemma with pressure to design more engaging exhibits for visitors while remaining true to their interests in displaying object collections and curating them for future generations. In this work, the researcher proposes an approach to designing constructivist interactive exhibits for history museums that utilizes methods developed by science museums. Topics researched include a study of the progression of history and science museum exhibition design in the twentieth century; the functional and educational requirements involved in constructivist science museum exhibits; and an analysis of how material culture methodologies can merge constructivist interactive exhibits with the examination of historical objects.

The researcher then applies this design approach in the development, fabrication, and evaluation of a constructivist interactive history exhibit at the Levine Museum of the New South in Charlotte, North Carolina. The evaluation results provides a resource of reflection for both the successes of this design approach as well as potential areas for further research.

MAKING YOUR OWN MEANING:

DESIGNING CONSTRUCTIVIST

INTERACTIVE HISTORY

EXHIBITS

by

Kathryn Marie Sikes

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APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

CONNECTING THEORY AND PRACTICE

History museums today face a dilemma with pressure to design more engaging exhibits for visitors while remaining true to their interests in displaying object collections and curating them for future generations. In this work, I set forth an approach to designing constructivist interactive exhibits for history museums that utilizes methods developed by science museums.

This thesis research grows out of a long term personal interest to connect my dual experiences in museum world: my personal experience of growing up at the hands-on science museum where my mother worked, and my professional experience of developing exhibits in history museums and studying in a public history based museum studies program. Though I have a mutual love for both history and science as subjects, I cannot help but contrast and compare the two types of museums, how their staffs designed and curated exhibitions, and most notably how each type of institution considered "interactive" exhibits. Does touching something make it interactive? Is a flip label interactive? Is a book interactive? Does it have to be on a computer? Can it be a comment left on a post-it note, or does it have to be a long-winded apparatus with push buttons? With these different components of museum exhibitions, I came to realize that the word "interactive" suggests vague activities and actions, as varied a set of meanings as the word "art" in terms of interpretation. Still, I noted a distinct difference in both the

quality and quantity of interactive exhibits in science museums versus history museums. While staffs at both types of museums designed and built them, they took divergent approaches and utilized clearly different working definitions of interactive in that process.

It seemed as if these working ideas about interactive exhibits grew out of the different overall approaches of these two types of museums. Echoing a sentiment that history museums and science museums represent intrinsically different institutions, many claim that history museums simply cannot compete with the bells and whistles found in science museums today. This frustrated me immensely, as history as a subject is not "boring" if presented properly, much like science. Yet several questions remained: *How* do science museums differ in presenting their subject matter? *What* criteria qualify an exhibit as interactive?

What Can History Museums Learn from Science Museums?

Operating with mission statements to collect, preserve, interpret and inspire, history museum staffs prioritize both objects and visitors. Conn (2010) notes a gradual shift in museum priorities and practices in moving away from collections and towards visitors over the past century. Curiosity cabinets have given way to exhibitions of small, select groups of objects with interpretative labels, graphics, films, and interactive elements. These more focused exhibits stand alongside a plethora of new museum spaces: classrooms, cafes, and gift shops and their attendant educational and social events. While Conn agrees that objects present their own epistemology, he states that

many history museums have moved beyond using objects as the primary source of information in an exhibition and provocatively questions if museums still need objects at all.

Such a question stirs great debate in the history museum field (Weil, 2002) as history museum exhibits by tradition root their missions and activities in the display of objects (American Association of Museums, 2001). As boards of these museums and the general public push for engagement and in museums, today's visitors expect more control and involvement with their leisure activities in an experience economy (Spock, 2005). Leading to characterization by some that museums turning into theme parks, more optimistic professionals advocate that higher visitor engagement and authority can reconcile with the missions and integrity of history museums (Russick, 2010; Spock, 2005). Science Museums with high visitor engagement (notably with constructivist exhibits) maintain their educational integrity, leading Russick (2010) to claim that history museums have "good reasons to look to science museums" if history museums want to be more engaging to visitors. He posits that science museums see interactivity as a "primary experience driver" with "a long track record of creating experiential and interactive learning environments" worth emulating (p.225).

Russick (2010) discusses the merits of looking to science museums in developing interactive history exhibits in that the limited literature on interactive exhibits at history museums does not address the effectiveness of such exhibits, and that analysis "often falls short when we try to establish baselines for interactives across museums" (p.225). While Russick mentions a handful of inspiring examples in his writing, the museum

exhibit literature itself reinforces his point by the number of published studies analyzing

interactive exhibit design at science museums. Russick references two notable studies

(the Exploratorium's *Active Prolonged Engagement* study and the *Philadelphia-Camden*

Informal Science Education Collaborative study) by name, arguing that both have

identified "valuable criteria" for history museums to consider (Russick, 2010 p.225).

This stark contrast between history and science museum exhibit design practices

comes down to differing priorities on the presence of artifacts with the museum, with

science museums heavily in favor of visitor engagement with virtually no objects in

exhibits at all (Conn, 2010,).   According to Conn, modern American museums today

have their roots in the late nineteenth and early twentieth centuries. Despite the inherent

complications in categorizing museums, for the sake of argument he describes the roots

of today's visitor focused science museums as the science museums of technology and

industry (separate from natural science or natural history) that began in the 1920's. While

these museums initially followed a curiosity cabinet object display based model similar to

other types of museums at the time, Conn argues that the very nature of the objects

displayed at these museums intrinsically set them apart, subsequently sending to

designers to different exhibit practices. Many objects of technology and industry of the

time – mass-produced commodities of communication, transportation and industry –

lacked the aura and singularity of objects displayed at art or history museums. Thus the

museum professionals needed to delineate another exhibition approach.

By arriving later to the cultural landscape, science museums also emerged just as

museums as a whole lost faith and interest in curiosity cabinet style exhibits, shifting to a

more visitor based focus. This combination of objects of limited appeal and waning emphasis on objects in general led the shift away from objects in science museums, with the Franklin Institute, for example, transforming as early at the 1930's into a museum with "push buttons and pull levers" that blurred "the line between education and entertainment" (Conn, 2010 p.53).

While tracing this development of science museums onward to the mid twentieth century, Conn (2010) reveals a shift in science museum content from the history of science to the principles of science. Why this shift happened is debatable, but Conn implies that the "tension between the history of science and its present and future" as a contributing factor, noting that the education offered by the display of science artifacts may not be efficient in communicating the current scientific practices of the era (p.53). Though not explicitly mentioned in his writing, one could also surmise that the Sputnik effect – the space race and its attendant challenges and opportunities – quite likely contributed to this push for "science of the present" education in science and technology museums.

In teaching concepts of science, museum staffs found historic scientific objects not as useful as the museum created objects, which evolved into the interactive exhibits of the present, complete with research on the effectiveness of these exhibits in context. A number of science museum interactive exhibits, particularly highly engaging constructivist ones, have the goal of the visitor learning concepts of science first hand as a "scientist." Russick (2010) argues that history museums should "develop exhibits that bring people into the process of doing history" as opposed to passively reading the

interpretations of historians (p.226). By designing interactive history exhibits with the goal of a visitor learning concepts of history first hand as "historian," history museums as institutions would not just transmit historical facts, but encourage visitors to think how historians think by gathering information and interpreting evidence. Designing interactive exhibits to teach history by actively involving visitors in this process of digging into history, of reflecting on and experimenting with historical interpretation, strongly parallels the behavior goals in interactive science exhibit design that have proven so engaging with visitors.

Translating this education goal of "concepts of history" in designing a constructivist interactive exhibit moves history exhibitions one step closer to Russick's call that history museums should look to science museums in their exhibit development. These design practices, particularly for constructivist interactive exhibits, also meet the demand for visitor engagement and authority that history museums face. The lingering tension, however, remains between desires for the successes of visitor engagement (as at science museums) while remaining loyal to the role of preserving, displaying and interpreting objects.

I believe that objects have a valid and important role in museums: the power of seeing a genuine object of aura and singularity in real space and time cannot be replaced or simulated. Instead, I propose a simple solution to use techniques from material and media culture in order to design a constructivist interactive exhibit with the goal of interpreting history from the objects it accompanies. Such an interactive by its very

design would have a mutually beneficial relationship with objects displayed in context with it.

First, I clarify the definitions and merits of interactive exhibits in the review of literature that follows in chapter two, demonstrating how theories apply in the design of interactive exhibits and how material culture works in cooperation with the guidelines I propose for constructivist interactive exhibits. I then lay out a design and research methodology for the interactive I designed and tested, as suggested in chapter three. In chapter four, I discuss the results of designing, fabricating, and evaluating a constructivist interactive at the Levine Museum of the New South in Charlotte, North Carolina.   In the final chapter, I reflect on the system I proposed to design interactive exhibits, and the place of such practices in museums.

CHAPTER II

CONSTRUCTING KNOWLEDGE IN THE MUSEUM

Museum studies and practices, like other disciplines, incorporate literature that represents a number of views and strategies. In order to better understand constructivist interactive history exhibits, I lay out a number of terms borrowing from museum literature; I demonstrate the applicability of museum education approaches around constructivism for this particular, sited project; and I propose an approach for this work that blends practices of interpretation through material culture with deep application in museums of all types. In sum, these areas I review help to provide context for the interactive exhibit at the Levine Museum.

What is an Interactive Exhibit? A Clarification of Terms

The American Association for Museums (AAM) defines museums as institutions that make a "unique contribution to the public by collecting, preserving, and interpreting the things of this world." (American Association of Museums, 2001). With more specificity for accreditation requirements, AAM indicates that a museum must be "essentially educational in nature." In reality a museum must balance both missions as a measure of true success. Conn (2010) concedes that institutions that house and display objects have shifted priority towards the visitor and have also set aside spaces for

classrooms, theatres, social events, cafes and gift shops in complex buildings. Museum

staffs have divided spaces within the museum building to address the various needs and

opportunities for education and displaying objects into spaces known as museum

exhibitions.

McLean (1993) describes these **museum exhibitions** as three-dimensional spaces

for environmental experiences with "interactions among people, real objects, phenomena

and ideas that make museum exhibitions unique" making them an essential part of

museums (p. 15). Although museum exhibitions can vary as much as the museums that

house them, McLean notes three universal principles: (1) "showing things" is the main

purpose of exhibitions; (2) exhibitions serve as a medium for communication; and (3)

exhibitions are experiential rather than product oriented (p.16). In elucidating these

principles, McLean suggests that "things" refers to the physical embodiment of

exhibitions ideas, and that such "things" include objects from a collection, as well as

museum-created objects designed to illustrate a principle, convey information or

demonstrates a phenomenon. Following these principles, McLean argues that a museum

exhibition uses these "things" as components of the three-dimensional environment and

as a medium of communication in order to generate an experience for visitors to the

space.

The components within an exhibition, not just the artifacts themselves, serve

museum goals of collection, preservation, and interpretation. Interspersed amidst

artifacts, **exhibition components** (a case providing a preservation role for an object, a

graphic communicating interpretation of an object, or a speaker producing a sound)

provide an experiential interpretation of an educational concept within the exhibition. In addressing these components with which visitors interact, Russick (2010) defines them as "a kiosk or device that engages peoples minds, bodies or emotions with a particular idea… a sort of experiential illustration" (p.221).

Semantically the terms "interactive exhibit" and "interactive" suggest quite vague and often confusing terms of scale, function, and mental and physical involvement. For purposes of this work, the term **interactive exhibit** indicates a kiosk-sized interactive element that can be either a component within a traditional museum exhibition, a component within an interactive museum exhibition, or a stand-alone experience in another museum space (such as a lobby). Above all, I rely on McLean's (1993) description of interactivity, whereupon the visitor acts upon the interactive exhibit, and the exhibit in turn does something to react and reciprocate to the visitor's action.

Though both imply the visitor interacts with an exhibit, the term **interactive** stands distinctly from the term **participatory**, because the latter defines the visitor only in relation to the exhibit while the former places emphasis on the exhibit's ability to react to stimuli provided by the visitor. McLean uses the example of a flip label to illustrate this point. As the visitor participates in flipping the label, it provides an impersonal response no matter which visitor flips it. Mclean (1993) implies that an interactive exhibit should be capable of multiple responses, what Russick (2010) indicates as activity and thinking unfacilitated by museum staff and that furthers "understanding of exhibition content" (p. 221).

To amplify the types of interactive exhibits possible, Kennedy (1990) describes the terms **hands-on** and **minds-on,** indicating either physical interaction between the visitor and the exhibit or mental engagement. In summation, an interactive exhibit requires minds-on involvement, but hands-on represents an optional activity. Kennedy makes use of Norman's (1988) concept of affordances to make the interactive exhibit's function and purpose clear to the visitor.   This theory not only deals with affordances (perceived properties of how to use an designed item) and constraints (limitations in how the item can be used), but also on how a user maps out how to make use of these affordances, and what the resulting action might be. Norman (1988) states that natural mapping (ones that take advantage of physical and cultural analogies) leads to immediate understanding and is preferred whenever possible. Such mapping can work to link a hands-on experience with a minds-on understanding in an interactive exhibit as well.

McLean (1993) states that interactive exhibits contain possibilities for meeting communication, behavioral, and emotional goals of the institution with each visitor through an engaging educational experience. While interactive exhibits can be tailored for different visitor learning styles (including the popular McCarthy's 4MAT model and Gardner's multiple intelligences theory), each interactive exhibit by its very educational nature has its own teaching style as well (McLean, 1993). These teaching styles follow pedagogy, (theory of teaching) in how the interactive exhibit communicates with (or "teaches") the visitor. To better understand the pedagogies utilized by museums, it's best to start with the approaches developed within the field of Museum Education.

Museum Education Approaches

     Much like museums themselves, education approaches vary greatly from institution to institution whether within museum classrooms, on guided tours, during lectures or as part of related programming. In examining education theories used in the museum world, Hein (1998a) broaches pedagogies by exploring the combination of theories of knowledge and theories of learning. Hein classifies knowledge along a continuum from realism, the notion that knowledge represents an objective independent entity that "exists outside the learner" and idealism, the notion that individual learner personally or socially creates knowledge in a subjective construct of the mind (Figure 1).

Knowledge exists
outside the learner
(realism)

Knowledge is
constructed by the
learner (idealism)
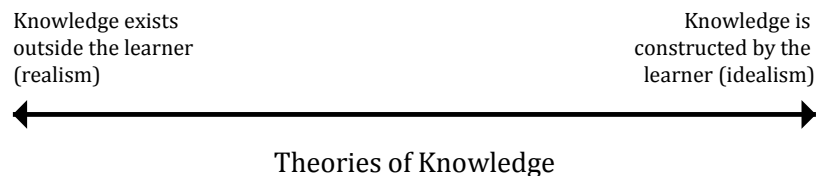
Theories of Knowledge

Figure 1. Hein's Theories of Knowledge Continuum.

     Hein (1998a) then describes a separate continuum of theories of learning, the theory of the passive mind at one end, where the learner absorbs and processes data over time (like an empty vessel to be filled), and at the other the active mind, whereupon the independent learner engages in process leading to the restructuring of the mind in response to knowledge (Figure 2).
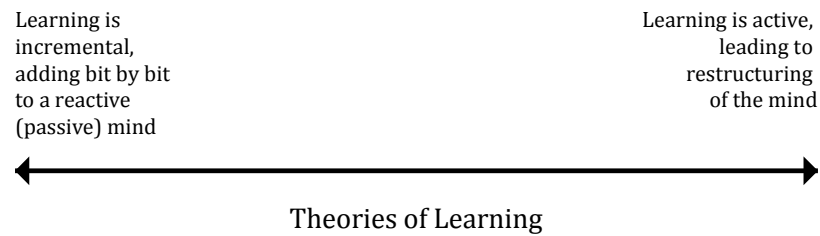
Learning is
incremental,
adding bit by bit
to a reactive
(passive) mind

Learning is active,
leading to
restructuring
of the mind

Theories of Learning

Figure 2. Hein's Theories of Learning Continuum.

By "placing these two continua …at right angles to each other" Hein (1998a p.32)
describes four different theories of teaching, that of Didactic Expository, Stimulus-
Response, Discovery, and Constructivism, each an overlapping segment on the two
continua (Figure 3).

Knowledge exists outside the learner

Didactic, Expository	Discovery
Stimulus-Response	Constructivism

Knowledge

Incremental, added bit by bit

Theories of   Learning

Active, leading to restructuring

Theories of

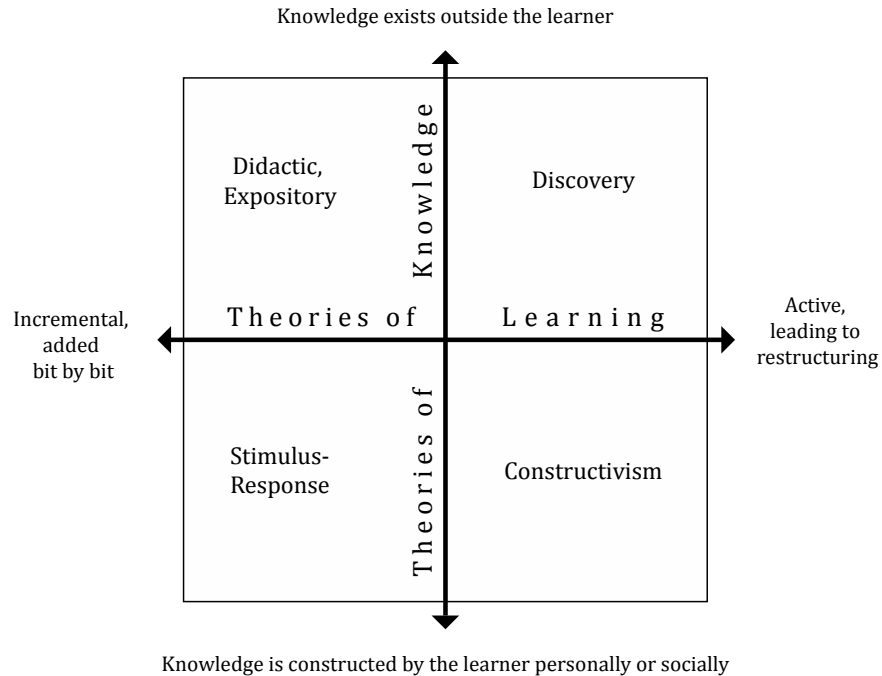Knowledge is constructed by the learner personally or socially

Figure 3. Hein's graph illustrating the relationship between the four pedagogies.

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According to Hein, Didactic Expository and Stimulus Response teaching, more commonly found in traditional classrooms, finds that learners absorb knowledge incrementally over the run of the course. Lectures best represent a Didactic Expository approach (wherein a speaker directly passes along distinct external knowledge in discrete pieces to the learner) and tests best represent a Stimulus Response approach (whereupon teachers reward desired behavior of scoring well on essays or test answers with good grades, even if the knowledge content varies from learner to learner).

The Discovery Learning and Constructivist approaches, more suited for interactive exhibit pedagogies, both follow an active learner approach to learning theory. Discovery Learning holds that by engaging learners in the proper activity, and given access to sufficient data, the learner independently comes to the "right answer" the teacher wanted them to discover. This trail of breadcrumbs approach relies not only on the independence of the learner, but also the independence of the knowledge: a set, discrete conclusion to which a learner should arrive. While theoretically ambitious, this approach represents a common pedagogy in interactive exhibits, akin to a pre-arranged lab experiment in a classroom.

As Hein (1998a) puts it, Constructivism "postulates that learning requires active participation of the learner both in the way the mind is employed and in the product of the activity" (p.35). In other words, the learner decides both the method in which they learn, and the meaning they make from their activities. A classroom analogy to a constructivist activity – a student generated research project – provides a vehicle where the student chooses the subject of research, creates a hypothesis on the subject, chooses a

procedural method to test that hypothesis, and generates conclusions based on

experimental research. By exploring and experimenting with a chosen subject matter, the

learner makes his or her own meaning from that subject matter.

A constructivist approach relies on the learner's prior experience that informs

knowledge and behavior so that "conclusions reached by the learner are not validated by

some external standard of truth but only within the experience of the learner" (Hein,

1998a, p. 37). This open-ended nature of constructivism raises both opportunities and

fears for museums, as it offers opportunities for deep visitor engagement (making use of

the visitor's prior experiences) but involves letting go of museum authority. Russick cites

Gutwill describing it plainly as the "goal is to put visitors in the 'drivers seat'," which

admittedly can bring about trepidations amongst some museum professionals (Russick,

2010 p.228). Hein argues that constructivist museum approaches, though more complex

for museum staffs to implement, provide significant learning experiences, with new

concepts assimilated into the mind in relation to prior visitor knowledge. When the

teacher or, in the case of an interactive exhibit, the designer acknowledges that new

concepts "compete with mental structures already present in the mind" to create activities

that work within that paradigm, visitors remain more likely retain this knowledge as

opposed to that learned by rote and repetition as in a Didactic Expository fashion (Hein,

1998a, p. 37).

Aside from higher visitor engagement and retention of knowledge related to

museum content, Hein (1998b p.153) advocates for museums as wonderful environments

for constructivist learning where visitors both control what they engage with within the

museum, and how frequently they engage the museum itself. While other pedagogies rely on fixed procedures or repetition, particularly Didactic Expository, Constructivism makes the most of irregularity in visitation by drawing from the visitor's experience than from other external sources. The open-ended nature of constructivism also fits nicely into McLean's (1993) goal of reciprocation in interactive exhibits, and Kennedy (1990) echoes that open-ended exhibits have an advantage in responding to unpredictable visitor behavior.

Constructivism as Applied in Interactive Exhibits

Many museum officials recognize the persuasive evidence of constructivist learning theory and have manifested numerous interactive exhibits within the museum field since the 1990s. Though he provides a few examples of these connections within history museums, Russick (2010) indicates that science museums dominate the development of constructivist interactive exhibits both in terms of research and literature. The Exploratorium's *Active Prolonged Engagement* (APE) Study (2008) provides the most convincing evidence of the approach in developing and evaluating said exhibits, along with visitors' engagements with them. This seminal study, cited by Russick (2010) and praised by both Hein and McLean (Gutwill, 2008 p. ii - iii) as a breakthrough study in constructivist interactive exhibits, emerged from earlier studies including the Science Museum of Minnesota's *Experiment Bench* (1994), the *Philadelphia-Camden Informal Science Education Collaborative* (PISEC) study (1997) and the Museum of Science's *Investigate!* exhibit (1998) (Gutwill, 2008 p.137)

Qualifying constructivist visitor behavior and quantifying it in terms of recurring behavioral attributes stood as an aim of the *APE* Study (2008), building upon previous speculation about planned discovery interactive exhibits. Gutwill (2011), a key player in the development and analysis of the *APE*, brought a slightly different perspective on constructivism and discovery learning from Hein, stating the pedagogies inseparability in exhibit design practice. Gutwill (2011) argues that while the learner creates knowledge in a constructivist manner, knowledge exists outside of the learner as well, due to common shared experience among people, mentioning examples such as mutually read books, shared physical encounters, or common language. Such external knowledge makes communication and culture possible. For example, given enough similar experience with the concepts of "5 o'clock p.m." and "train station," two different people will both be able to understand the phrase "the train arrives at 5 o'clock p.m.".

Gutwill (2011) suggests the use of both Discovery Learning and Constructivist approaches for inquiry behavior within museum exhibits, but that the "choice point" between the two pedagogies depends on whether the end goals of the exhibit are content based, or behavioral based. When the goal of an interactive exhibit is to communicate a specific part of a cannon of knowledge to a visitor, designers and educators might select a discovery learning approach. Conversely, designers and educators might choose constructivist modes to generate inquiry behavior involved with general content in an interactive exhibit.

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This notion of the interconnection of Discovery Learning and Constructivism – that the use of common external knowledge is essential for communication – fits in well with Jeffery-Clay's (1998) discussion of constructivist exhibits and varying interpretations of Constructivism. Jeffery-Clay states that constructivists agree that "we all construct our own knowledge" upon preexisting knowledge structures. This scholar moves on to argue that these knowledge structures have to start somewhere, and that sometimes this preexisting knowledge comes from other means of learning, such as rote (Didactic-Expository) learning. Nevertheless, Jeffery-Clay postulates the linking and rearranging of new knowledge structures with the old in a constructivist manner yields knowledge "more stable and more accessible" in the mind (pp.3).

In light of these arguments, explicitly designing an interactive exhibit to have both discovery learning and constructivist elements working in tandem benefits the visitor by providing opportunities to both develop a knowledge structure on exhibit content and further build upon and add to that structure independently. In short, a discovery element in an interactive provides scaffolding in introducing exhibit content and as a springboard for further constructivist exploration. A similar approach already used in classrooms features teachers who give developed projects to students before the student's pursue their own research projects. Not only can a discovery learning element provide an example of one form of engagement with exhibit content, it introduces more content to a visitor, reducing the interactive exhibit's sole dependence on the visitor's prior knowledge relating with the content.

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A simple pattern block activity provides a useful example of how such a combination of discovery and constructivist elements can work in tandem in an interactive exhibit design. In his book Gutwill (2008) notes an interactive exhibit named the Tiling Table at the Exploratorium as an example of the Exploration type of Active Prolonged Engagement (p.7). This bordered table provides the location where visitors piece together a number of popular flat geometric pattern blocks in a free form manner (Figures 4 and 5).

Figure 4. Photo of geometric pattern blocks.

Observing behavior at
Tiling Table reinforced
Exploration as a form of APE.

Figure 5. Drawing of the pattern block Tiling Table in the Exploratorium's APE publication (p.7).

The exploration of the different patterns and combinations created by these blocks constitute a simple constructivist activity, as the multitude of outcomes make the activity open ended, and the way in which the visitors configure patterns determined by prior knowledge and experience (Figure 6).
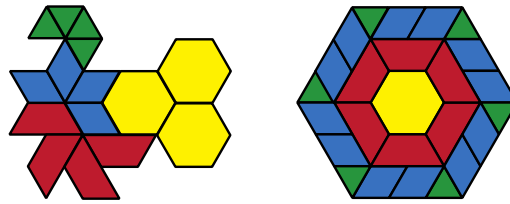

Figure 6. Two examples of different combinations made by the pattern blocks.

A graphic indicating the free form nature of the blocks, with a tie in to a real world context can frame this activity as a constructivist exhibit (Figure 7).
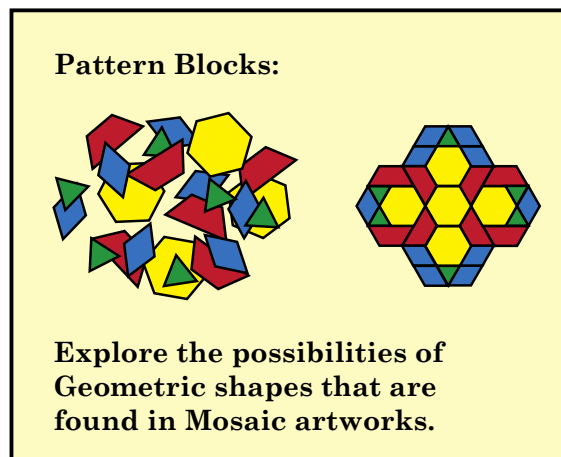

Figure 7. Example of an exhibit label for a hypothetical Constructivist interactive exhibit using pattern blocks.

However, by creating a template and a question with a predetermined answer, visitors can utilize these blocks as a simple discovery learning activity where visitors discover the principle of shapes aggregating to make other shapes (Figure 8).

To Do and Notice:

Can you make four hexagons, one for each color?

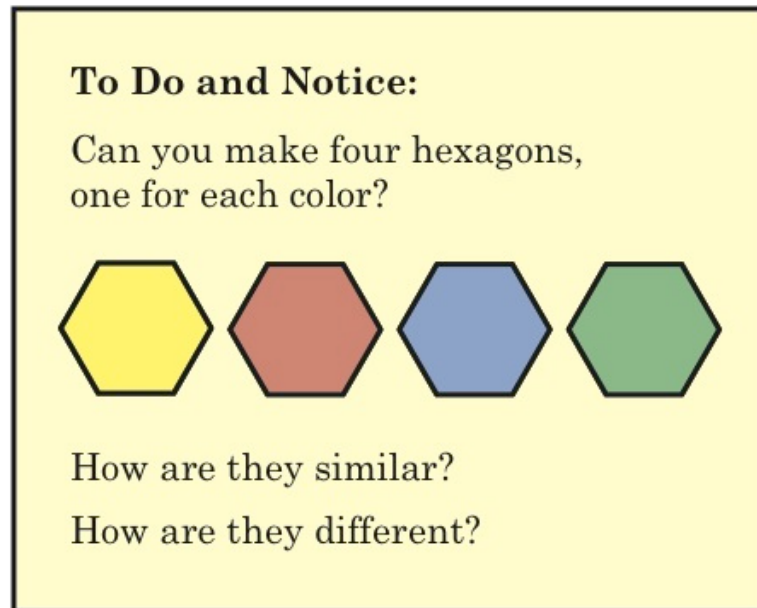How are they similar?
How are they different?

Figure 8. Example of Question Graphic for a hypothetical Discovery Learning interactive exhibit using pattern blocks.

In a traditional planned discovery interactive exhibit; an explanation graphic accompanies the exhibit as well (Figure 9) (Gutwill, 2008, p.1).

What's Going On:

Each color of block represents a different *fraction* of the hexagon shape. The hexagon can be whole (yellow) or divided into halves (red), thirds (blue) or sixths (green).

What other kinds of hexagons can you make?

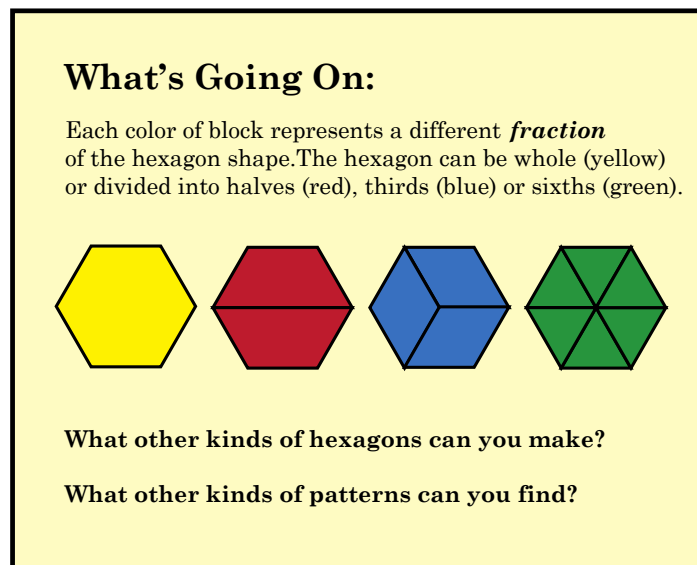**What other kinds of patterns can you find?**

Figure 9. Example of an Explanation graphic (to pair with the Question graphic shown in Figure 8) for a hypothetical Discovery Learning interactive exhibit using pattern blocks.

However, if the interactive exhibit is designed where the template (discovery learning) activity is part 1, and the free-formed exploration (constructivist) activity is part 2, there are increased opportunities for visitor engagement at the exhibit. The free-form activity provides opportunity for further engagement beyond the template activity, yet the free-form activity can be informed and enriched by principles learned from the template activity.

Another advantage for a constructivist interactive exhibit with Discovery Learning elements occurs when the majority of interactive exhibits in a museum exist in a Discovery Learning in model. Visitors then expect the closed and straightforward nature of discovery learning exhibit. Falk (2008) discusses such seeking and expectation behavior of visitors and visitor identity. According to this theory, the identity fulfilling needs that brought visitors to the museum in the first place determine how visitors direct

and judge their museum experience. For example, Falk describes that a visitor he identifies as a "spiritual pilgrim" will view a museum as a refuge for calm and quiet contemplation. In this view, such a visitor will seek out opportunities to sit and quietly contemplate museum content and ideas. In turn, if a visitor views interactive exhibits as a source for Discovery Learning, the visitor expects them to be direct and predetermined in nature. By incorporating Discovery Learning elements into a Constructivist Interactive exhibit, this hypothetical visitor receives what they seek but might also find themselves stepping into constructivist engagement upon further participation with the interactive exhibit.

I suggest that a strong Constructivist interactive exhibit design often conflates with a Constructivist–Discovery Learning hybrid design, to some degree. Thus, I include this hybrid dynamic in the criteria for Constructivist interactive exhibit. I propose, therefore, that a Constructivist Interactive exhibit: (1) provides activities that are reciprocal with visitor actions; (2) introduces basic content goals via a Discovery Learning activity; (3) folds in Constructivist learning activities and behavioral goals for further content exploration; and (4) utilizes a theory of affordances in the physical design of the exhibit.

Constructivist Interactive Exhibits in History Museums

In order to apply these general criteria for constructivist interactive exhibits into an approach useful to history museums in the object/visitor engagement dilemma, one must identify a way of a "process of doing history" (Russick, 2010) that relates to objects

in a constructivist manner. I believe that processes of material and media culture, as described by Prown (2000) and Hebdige (1979), satisfy both of the content needs for a constructivist interactive history exhibit in that they provide a constructivist approach towards analyzing objects.

As outlined by Prown, his method of analysis questions the origin, use and intent of an object by deduction through the description and interpretation of the object's material characteristics, formal properties, and its historic context. By relying upon previous knowledge of the interpreter, as well as the open-ended nature of analysis in the Prownian method, this constructivist approach to researching and interpreting history opens many possibilities for history museums – and for constructivist interactive exhibits therein. One major shortcoming of the Prownian approach, however, results from the narrowing of possible interpretations of the objects. By exploring a different side of object interpretation, as Hebdige (1979) argues, an object symbolizes different meanings in light of the differing connotations media culture has created for that object. The meaning of a mere safety pin, for example, varies depending on use and other artifacts used with it. When used with a white cotton diaper, one meaning results while clearly a different meaning results when paired with black leather. With more open-ended responses from material objects comes the possibility of even more material upon which to draw into the interpretation of a given object's history and meaning.

Material and media culture, far from new concepts and approaches in history museums, have long provided strategies for exhibit development and in museum education programming. The proposed approach for designing constructivist history

interactive exhibits calls for material and media culture techniques to more deliberate

intention as a "process of doing history" (Russick, 2010) in an interactive exhibit, much

like the explicit use of "concepts of science" in successful science museums (Conn,

2010). Object identity, media culture sources, and lower level analysis all provide

opportunities for discovery learning and content introduction. Additional variation of

sources and activities designed to pull prior knowledge from the visitor indicate

opportunities for constructivist engagement with the object and its context.

I find this approach particularly useful for engaging visitors with everyday objects

found in history museums and historical sites. These artifacts represent more common

exhibition material than the singular, art historical object. Everyday objects, more likely

to be in a person's life prior visitor experience, provide another pathway to understanding

and use. If a visitor connects by engaging as a historian with objects through the method

I propose herein, this act of making meaning from the world around them carries on

beyond the walls of the museum as well.

While presenting and elaborating upon my approach to designing constructivist

interactive exhibits for history museums suggests an important part of my thesis, the real

world application of the theory determines the actual validity of my approach. In the next

chapter, I detail the design and observation methods for a specific, sited material culture

interactive exhibit implementing my theoretical approach at the Levine Museum of New

South in Charlotte, North Carolina.

CHAPTER III

DESIGNING AND TESTING AN INTERACTIVE EXHIBIT

In order to test if my approach to designing constructivist interactive history

exhibits applied in the real world, I implemented and tested my ideas in an actual

interactive exhibit at a local museum. In this chapter I detail the methods by which I

carried out this design and evaluation process of the interactive exhibit.

To begin, I selected a museum in which to develop the interactive exhibit, and I

chose the Levine Museum of the New South in Charlotte, North Carolina for both its

location and award winning reputation for innovative exhibits (Levine Museum of the

New South, 2010). After discussing the idea with Levine staff, which expressed curiosity

in exploring new approaches in Constructivism in interactive exhibit design and design

project began in the summer of 2011.

With this client-designer relationship established, I adopted a programmatic

design process utilized in interior architecture on this project (Demkin, 2008, p.522).

Discussions began to determine the site within the museum for the interactive exhibit,

and museum staff determined that the *Southern Power* section of the Levine's *Cotton

Fields to Skyscrapers* permanent exhibition as the best fit, not only in terms of museum

needs, in that the staff desired to pull more visitors into the space, but also in the presence

of "everyday objects" (early domestic appliances) featured in *Southern Power* – a

suitable match for constructivist material culture activity. Also by adding this interactive

exhibit to a preexisting exhibition space, I was able to test how my approach would work

in terms of integrating interactivity into an established space, which is a common

logistical need for museums that are obligated to permanent exhibitions.

From there, I collaborated with the Levine staff to identify the programmatic

needs of the interactive exhibit based on the analysis of the site, users of the space,

logistics of fabrication, cost, as well as overall schedule. Due to the lighting needs of the

interactive, the desire to draw visitors into the *Southern Power* exhibit, and the physical

constraints of the exhibit space, we determined that the interactive exhibit should be

kiosk scale, and located within *Southern Power*, within the line of sight of the entrance
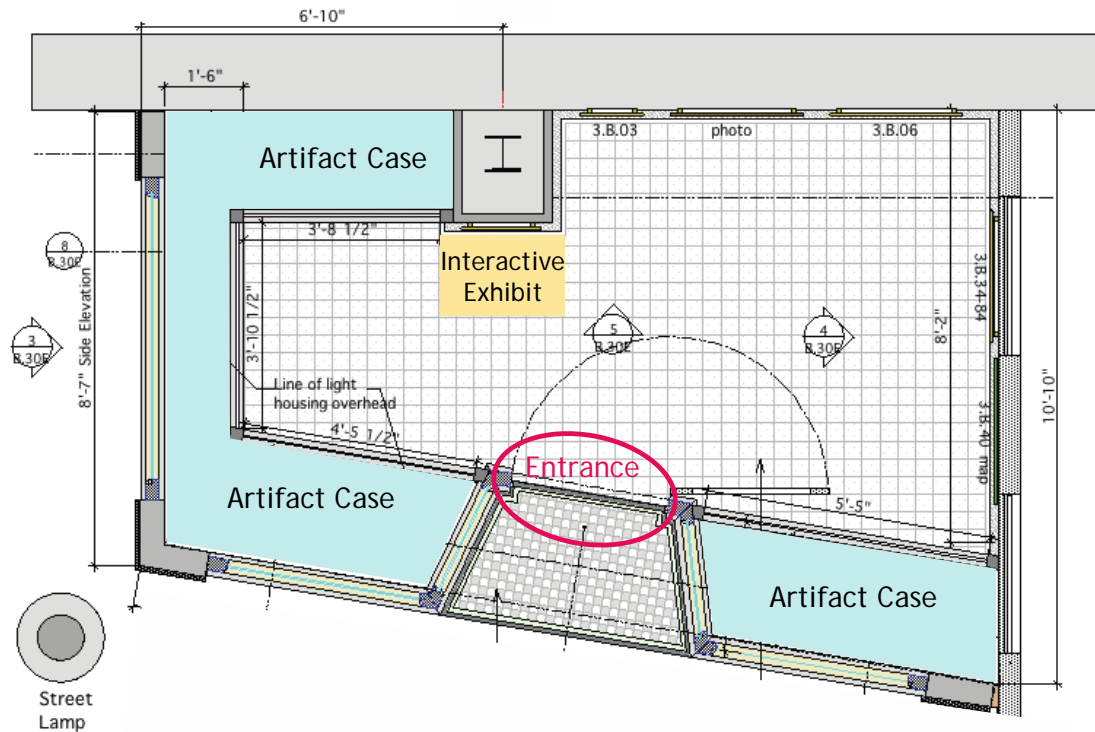
into the space (Figure 10).

Figure 10. Plan view of the *Southern Power* room within the *Cotton Fields to Skyscrapers* Exhibition at the Levine Museum of the New South. Entrance, artifact cases, and the location for the interactive exhibit are highlighted.

Museum staff noted that users of the space varied, as an exhibit open to all museum visitors. The staff and I delineated goal ages and populations as fifth graders, eighth graders (which frequented the museum in field trips), eleventh graders, and, potentially, adults. The staff pointed out that younger children could hypothetically use the interactive, though this group does not have high incidence of a presence in the exhibit. Due to museum budget constraints as a project initiated for my thesis research, staff decided that I would have sole responsibility for the cost and fabrication logistics of the interactive exhibit, but that the museum would assist with content development and storage requirements. The overall schedule of the project, established by the academic

calendar for my thesis research, included design development and fabrication of the

interactive exhibit in the fall semester of 2011, and the evaluation of the interactive in

February 2012.

After identifying the basic programmatic requirements of the interactive exhibit, I

worked the Levine staff on a conceptual pre-design by outlining the functional goals of

the interactive exhibit. The Levine staff listed their own educational goals for the exhibit

area, ranging from basic identification of artifacts and the historic presence of electricity

related to the objects, to the recognition of technology in changing life styles and

comparative opportunities with technology and technologically based objects in the

present. The Levine museum educator involved in the project also suggested the use of

Bloom's taxonomy (Martin, 2000 p.229) in generating different potential levels of

involvement with exhibit content.

Due to the nature of my thesis research, I too had criteria for the educational and

functional goals of this interactive exhibit project. I designed an interactive exhibit with

reciprocal, multi-outcome interpretations as a result for visitors. I specifically designed

an activity that would generate constructivist behavior for the specific site and artifact

circumstances in the *Southern Power*. To build these goals into my project, I used

abstractions of the four types (Exploration, Investigation, Observation and Construction)

of Active Prolonged Engagement (APE) as described by the Exploratorium's publication

(Gutwill, 2008, p.7). I also involved a process of history (as recommended by Russick,

2010) via the methods of material and media culture. To accomplish this latter task, I

simplified the basic steps of Prown's (2002) analytic method (Description, Deduction,

Speculation), and included Hebidge's (1979) argument for an "alternate view" via media connotation.

In order to narrow this conceptual pre-design into something more useful in developing a schematic design for the interactive exhibit, I experimented with combining and hybridizing these potential aims for the interactive exhibit. I matched all these educational goals of the Levine staff to levels within Bloom's taxonomy, and developed three Levine/Bloom hybrid goals (Figure 11).

Levine content / Bloom's	What are these objects?	Electricity was a new addition to Charlotte homes in the 1930s	How do technologies of the past relate to technologies of today?
Knowledge & Comprehension	Recognize and Understand Objects		
Application & Analysis		Understand that electricty is a connection and distinction of the objects	
Synthesis & Evaluation			Evaluate the relevance of this technology in history compared with experinces of today

Figure 11: Crossing the Levine's Education content goal with levels described in Bloom's Taxonomy.

I then worked to combine the four Active Prolonged Engagement types of activities with a corresponding step in a material/media culture analysis of an object to create four Material Media Culture/ APE activity goals (Figure 12).

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Material and Media Culture Approaches

	Description	Deduction	Speculation	Alternate View
Investigation Approach			hypothesize on the use and meaning of the object based on your research, and external sources	
Exploration Approach		explore sensory, emotional and intellectual impressions of the object		
Observation Approach	note physical designs and details of objects, how they have evolved over time and relate			
Construction Approach				consider other interpretations of this object, what other takes you have on the object external to what it is

Active Prolonged Engagement Approaches

Figure 12. Crossing the four types of APE with four steps of Material Media Culture analysis.

From there I cross referenced the Levine/Bloom educational goals with the

MMC/APE activity goals to manifest a schematic in which to brainstorm the educational

and functional needs of the activity created for the interactive exhibit project (Figure 13).

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Levine Content / Blooms — APE/ Material Media Culture	Recognize and Understand the Objects	Understand that electricty is a connection and distinction of the objects	Evaluate the relevance of this technology in history compared with experiences of today
Observation Approach (Description)	How does this object look like appliances you know? How does it relate to your home, or the mill worker's house?	Note what is common amongst the objects. Why is this significant?	How have housework objects evolved between now and then? Which advances have been the most significant?
Exploration Approach (Deduction)	What are your impressions of this object? What do you think they do?	How do you think these objects made prospective buyers and users feel? What purpose do these objects serve?	How does advertisting of these artifacts compare to gadget adveristing today? (lok through constrasting ads)
Investigation Approach (Speculation)	Look at the features of the artifacts, how your imagine they're used, and the historic context to speculate what they are	How do these objects change house work compared to their non electric precedents?	Speculate how the advent of the electrcity in households compare to the advent modern technologies? (comapare and analyze)
Construction Approach (Alternate View)	What does this object look like to you? What associations do you have with these objects?	How would you explain electricity, or sell these objects to a mill worker?	Create an advertisement for one of these objects as a new technology

Figure 13. Chart crossing the Levine/Bloom educational goals with the MMC/APE activity goals.

From these beginnings, I suggested several schematic designs based on the programmatic needs of the interactive exhibit and spreadsheet of potential educational/functional goals. What began as twelve sketches of ideas evolved into a smaller number of prototypes in response to feedback from students and faculty in my graduate studio class. I then presented four prototype activities to the Levine museum,

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including a shopping activity on cards (matching people to artifacts); a design

investigation activity (where visitors would examine how the physical design of objects

connected with its function and identification using small models); a design exploration

activity (where visitors could design hypothetical products using parts and pieces found

in the artifacts), and a puzzle block activity (where visitors combine and recombine

images on wooden cubes to explore information about the artifacts of the past and

present). Of the prototypes presented, the Levine staff selected the people related content

of the shopping prototype, and the artifact related content and activity of the puzzle

blocks. From these schematic designs, the Levine staff and I decided to combine the

people-artifact version with the puzzle blocks design for further revision.

During the iterative process of designing and revising the blocks prototype, I

tested various aspects of the blocks: the number of blocks, the nature of combining

blocks, and the affordances utilized to confirm when a certain combination of blocks

"matched." After experimenting with a few iterations of blocks, the staff recommended a

smaller number of blocks (four) and a limited number of combinations (utilizing a frame

based "match" as opposed to a unit based "match" for blocks) to avoid confusion and

frustration for the users (Figure 14).
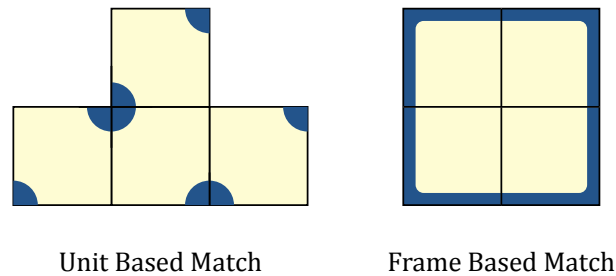
Unit Based Match   Frame Based Match

Figure 14. Two different designs to "match" the faces of the blocks via visual affordances.

While the aesthetic design affordances were coming into focus, I moved on to establish the conceptual and content-based affordances of the blocks. Early versions of the blocks included six blocks, with each "match" of block facts in the following categories: (clockwise from top left) Customer Biography, Vintage Advertisement Text, Vintage Advertisement Image, Object Image, a Question, and Customer Motivation (Figure 15).
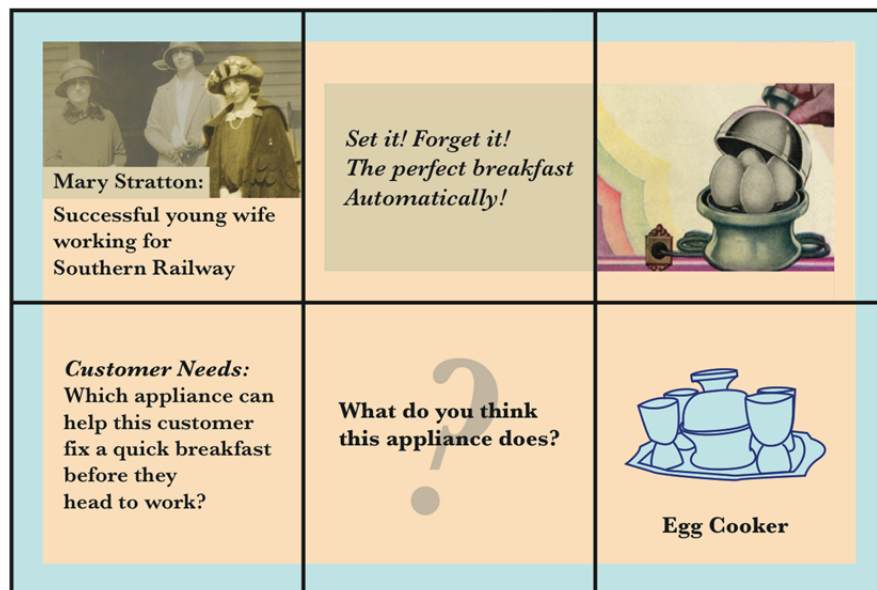

Figure 15. An example of one of the matches possible in six-block frame design

While each face communicated bits of information, the staff and I determined that the lack of orientation devices for block puzzle users, made it challenging for users to determine how the information connected and how the matches could be made. In this version of the design, I attempted to make as many of the blocks as interchangeable as possible for a higher number of outcomes, where all but the vintage ad image and the object ad image could be interchanged with each other (Figure 16). Vague and confusing content and conclusions resulted for a pre-test group of users from my school as well as the Levine staff, leading to subsequent design changes.

Figure 16. Two of the possible correct matches in the six-block frame model. Pre-test users found this model too vague due to the lack of content affordances in this design.

I then proceeded to redraft the content affordances of the design, and upon suggestion, cut the number of blocks down to four. In this design, users could match a combination of blocks by both color and a question relating objects and people featured in the yellow circle formed in the center. Under this iteration, users could combine block faces to offer clues as to how one might answer that question, using hints from blocks themselves (see an example in Figure 17).

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This redesign also changed the type of information presented on the blocks. For example, I designed a green frame and posed the query: "What Might Customers Buy?" with matches on green-framed block faces for Object Images or Customer Descriptions. In the end, I included green-framed block faces on two opposite sides of each of the four puzzle blocks (Figure 17)
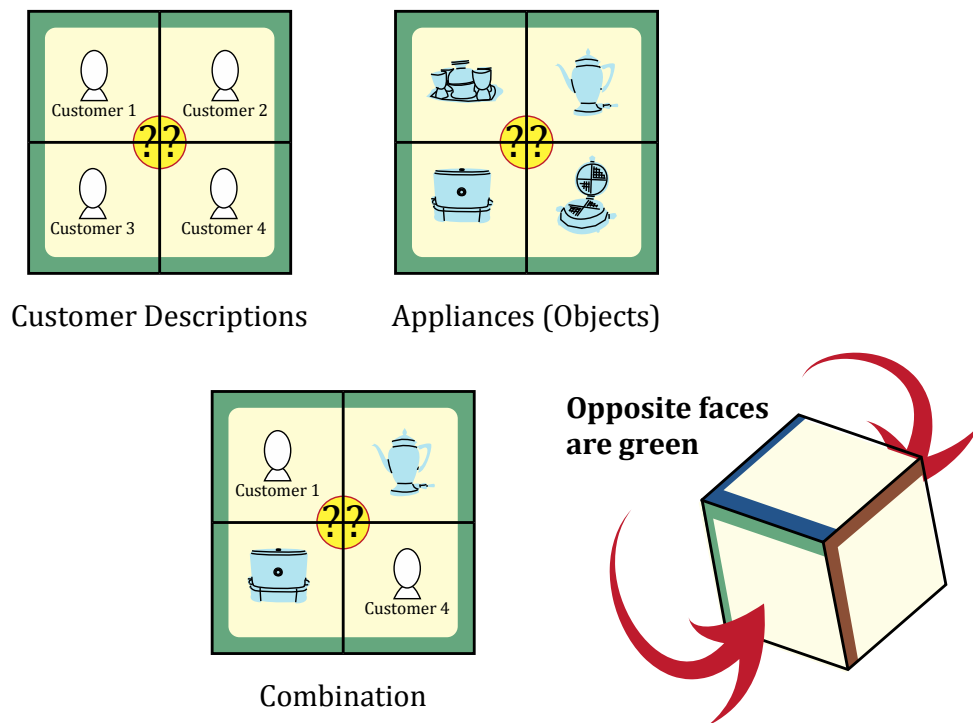

Customer Descriptions   Appliances (Objects)

Combination

Opposite faces are green

Figure 17. Green-framed faces of the block would match to ask "What Might Customers Buy?" while presenting one of many combinations of Customer Descriptions and Object Images.

The concept behind this green frame puzzle activity was to recreate a process of history research where the historian (or in this case visitor) works to answer a research question by using the historical sources that he or she finds. The multiple matches to a

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question generated by the blocks provides multiple combinations of sources that the user can pick from in their "research" of the block content. The open ended and subjective nature of these conclusions not only rings true to the multiple-interpretation nature of history research, (as no one match for the blocks puzzle is objectively any more correct that another), but it also provides an opportunity for constructivist engagement with the content. This is because the conclusions made (and therefore knowledge gained) from the interactive is generated and determined by the visitor as they use the blocks puzzle activity as a vehicle for researching the role of customers and advertisements in relation to the objects.

Alternatively, I set up another constructivist activity asking "Why Shop at *Southern Power*?" on the blue-framed block faces which, when matched, would offer a user a combination of Customer Motivations for shopping and Vintage Advertisements of the Objects (store motivations for shopping). For this color, too, I designed blue-framed block faces on two opposite sides of each of the four puzzle blocks (Figure 18).
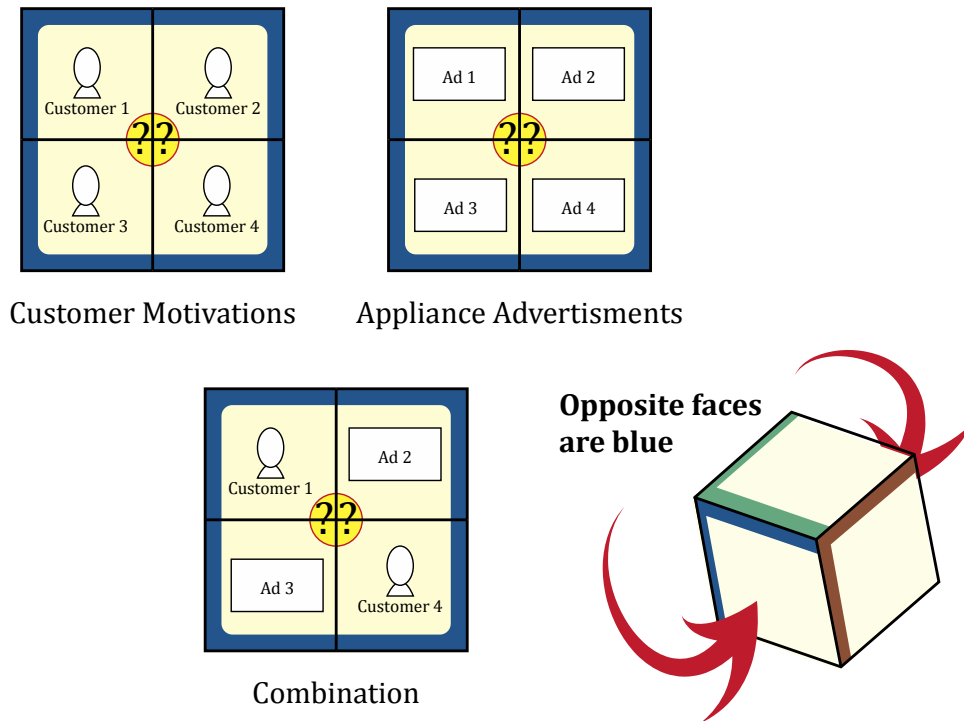
Figure 18. Blue-framed faces of the block would match to ask "Why Shop at *Southern Power*?" while presenting one of many combinations of Customer Motivations and Vintage Advertisements.

Throughout the iterative design of this block puzzle, Levine staff expressed concerns of confusing visitors that used the puzzle, as no place in the exhibit explicitly identified and described the objects in the case discussed on the puzzle blocks. Staff also expressed concern that some visitors would prefer one clear solution to this open-ended block puzzle. To address this concern, I designed the brown framed faces of the blocks to combine in only one way (thus creating a discovery learning puzzle) in order to design an advertisement for *Southern Power* based on the historic content of advertisements, generally. I duplicated the four brown-framed block faces in order to cover the last two

remaining opposite sides of each of the four blocks to increase the odds of a visitor

matching the brown frame first (Figure 19).
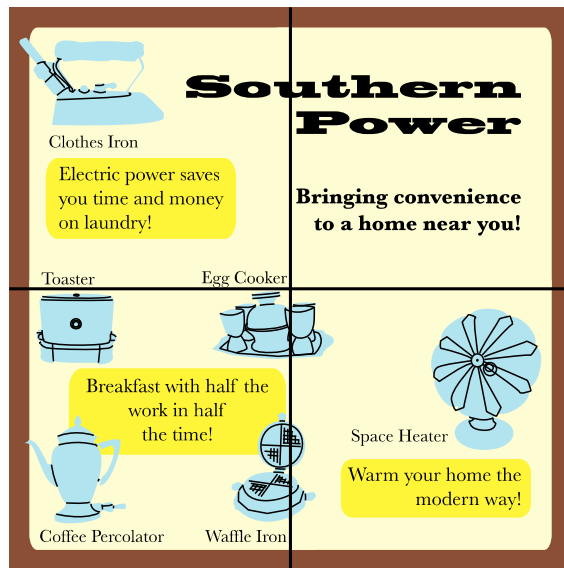
Brown Framed Faces
have only one match
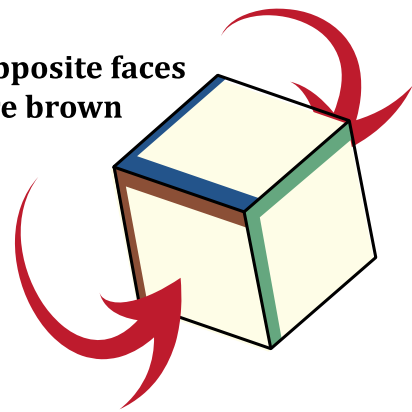
Figure 19. Brown-framed blocks were designed to only have one correct match so as to provide a
Discovery Learning element to the interactive exhibit.

In my estimation, this addition of the Discovery Learning component to an

otherwise open-ended Constructivist puzzle activity completed the design of this

interactive exhibit. Thus, the exhibit provided information to visitors new to the artifacts

in the case, and provided a frame of reference for visitors to connect their constructivist

exploration with the multi-outcome parts of the puzzle. This interactive now met (as well

as helped develop) my criteria established in the literature review, utilizing material and

media culture approaches to researching history by using actual artifacts and images (advertising and various objects) to analyze object meaning. Further, the amended design provided an opportunity for visitors to reach the museum education goals of object identification, the historic place of electricity linking to these objects, and the resulting changes this technology made on user lifestyles.

After I completed the schematic design of the interactive exhibit up to the standards of my class, and the Levine staff, I fabricated a prototype. I drew colors for the interactive exhibit prototype from colors of the *Southern Power* exhibit space, as well as prominent colors of the artifacts, artifact case and labels (including browns, greens and blue). I designed the pedestal (Figure 20) on which the puzzle block rested in a case building method I learned while working at museum exhibit design shops as a 30" high support to stay within generally accepted museum practices and standards established in the American with Disabilities Act (1991).

Figure 20. Photograph of the interactive exhibit as seen from the door of *Southern Power*. Elements related to the interactive exhibit are highlighted, as well as the height of the pedestal as an indication of scale.

After fabrication I installed the interactive in the agreed upon location in the exhibit. In this post design evaluation phase of my design process, I assessed the

interactive exhibit's actual success in reaching the goals established by the Levine staff and by me, as the designer. In evaluating this interactive exhibit, I utilized well-recognized methodologies from the museum field including timing and tracking (Serrell, 1998) and surveys that I learned during my internship with the Exploratorium in June 2011.

In the first step of the process, I tracked, noted and timed the actions of each visitor if they voluntarily entered the exhibit area under observation. Accomplished from a distance of about 30 feet away, (so as not to engage with or influence a visitor using the space) I noted what visitor appeared to be walking to, looking at, reading, engaging with, or talking with someone about the exhibit. While some institutions go one step further and videotape areas (such at the APE project, Gutwill 2008), for this project I simply took notes from first hand observation of visitors that entered the *Southern Power* room.

In the second step of this evaluation process, for visitors that spent a significant amount of the time in the exhibit space, I asked if they would participate in a survey shortly after they left this space. For this completely voluntary interview, I did not record personal information, nor did I label answers as "right" or "wrong." I designed this survey to gather visitor feedback and impressions of experience, carefully avoiding leading questions while still prompting visitors to discuss their opinions of the interactive exhibit. In the case of my research, I requested interviews from visitors that spent at least 30 seconds in the *Southern Power* room, and I adapted my survey tool from a format utilized at the Exploratorium during my internship (See Appendix A).

I then compared the tracking and timing notes with their corresponding interviews and entered this information into an Excel sheet for comparison and analysis. Adapting the Exploratorium approach of an "emerging coding scheme" as described by Patton (1990), I coded and quantified the qualitative responses given by visitors. I noted where codes emerged as multiple visitors indicated similar answers (or part of answers) in response to survey questions.

As an example, I asked a visitor "Can you tell me a little bit about what you did in this room?"(referring to the *Southern Power* room) early on in an interview. The visitor answered: "Looked at the appliances, read a little bit on the wall," and I coded for "artifacts" and "read labels" as their response. For the visitor who answered: "Just walked around, read the things," I coded for "read labels" as their response. I found that coding helped simplify the large amount of qualitative data collected in the interviews, and assisted with finding and quantifying patterns found within those interviews. While timing and tracking data helped establish the context for each visitor's interview, the visitor responses helped to both elaborate and correct assumptions upon the visitor's actual experience with the exhibit.

In the following chapter, I unfold the evaluations in total to analyze the results of the interactive exhibit prototype for the Levine Museum. In doing so, I draw conclusions about my application of this design approach for interactive history exhibits. With this case study approach in mind, I comment on the validity and practicality of interactive and constructivist exhibits for history museums.

CHAPTER IV

GROUNDING THEORY IN PLACE

For this evaluation study I timed, tracked and interviewed 30 groups of visitors

attending the Levine Museum of the New South's *Cotton to Skyscrapers* exhibition

during the last two weekends of February 2012. The Levine Museum did not charge

admission fees to the public three out of the four days I collected responses. For the

visitors evaluated, I requested interviews from those who spent 30 or more seconds in the

Southern Power room within the larger exhibition. Time spent in the room by the visitors

I evaluated ranged from 0'38" to 4'14", with the average time recorded at 1'54". Half the

visitors traveled in pairs, a quarter of the visitors came on their own, and a quarter of the

visitors traveled to the exhibit in groups of three or more people.

Due to the distance of my viewing post, and without the aid of a camera to record

visitor actions, I only gathered limited information. Over a third of the visitors either self

initiated participation with the blocks (that is, they used the blocks during tracking

period) or they decided not to use the blocks upon prompting during the interview. For

those visitors that used the blocks at a distance from my observation, I did not gather data

on how exactly they interacted with the blocks (what they matched, if they matched, how

they matched). Of the 18 visitors, I observed directly during the interview process, two-

thirds read blocks individually, one third matched the blocks, and one third read aloud or

talked with another person while using the blocks. Users matched blocks using both

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colors and sentences and three users also quoted text from the blocks at some point

during the interview. One family group (a senior woman, a teenage girl, a 10-12 year old

girl and an under 10 year old boy) not only worked together to match the puzzle with

colors and sentences, but the children read (and answered) a question aloud, and

identified the toaster and its use with the one on display in the case. I note here that their

interactions represented unfacilitated play, as the woman accompanying them oddly

expressed a lack of interest in the interactive exhibit.

In terms of the educational goals of the exhibit, the blocks appear fairly successful

in communicating to the users. In response to the query: "What do these blocks

communicate to you, if anything?," half of the visitors mentioned advertising/ shopping

(n=15); half mentioned information involving people and home life (n=14); one third

(n=11) connected the blocks to the appliance artifacts; and one third (n=12) connected the

blocks to the concept of electronics in history. Only one sixth (n=5) of those interviewed

felt that the blocks did not communicate to them (Figure 21). Some of the responders

mentioned a combination of these various ideas, resulting in some overlap in coding. The

youngest individual interviewed (a 10 year old girl) gave the most succinct answer by

saying the blocks told her why people would "buy those things back in the day" because

"it showed what people bought and why they would use it." This single response

represented the only interview where the respondent expressed overlap for all four coded

ideas.
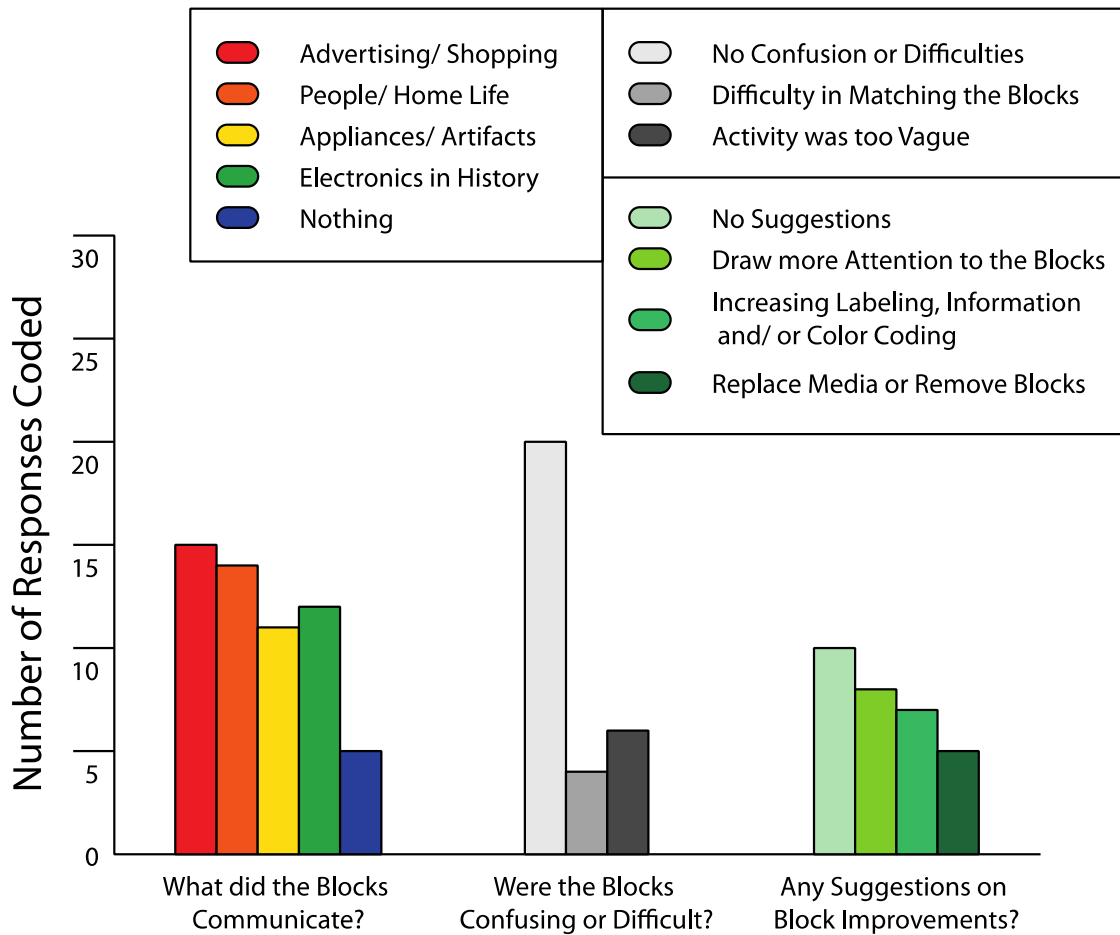
Figure 21. Graph showing the number of coded responses for three of the surveyed questions.

To check for visitor usability of the interactive, I asked visitors to identify

anything they might find confusing about the blocks, as well as suggestions for design or

information improvement. Two thirds of visitors (n=20) reported that they did not find

anything confusing or difficult to absorb about the blocks or the information contained on

them. In the balance of the total sample, four users expressed difficultly in matching the

blocks, and six users found the activity too vague or were confused about the directions

(Figure 21). One quarter of visitors (n=8) suggested drawing more attention to the blocks

somehow either with signage or by making the blocks bigger. One quarter of visitors

(n=7) suggested increasing the labeling, information and color-coding present on the

blocks. One sixth of visitors (n=5) suggested replacing the blocks with a touch screen or

just removing the blocks, as they personally preferred different forms of media for

information transmission (Figure 21).

Media in the Interactive Exhibit

When I asked visitors to discuss whether or not they found the blocks interesting,

almost two thirds of their responses (n=18) related to the medium of the blocks, but for

split reasons. Half of this group (n=9) referred to the medium of graphic blocks for the

interactive exhibit as either interesting or somewhat interesting. A few visitors even

identified the quality of being able to "pick them [the blocks] up" and "play" as what

drew them to the interactive exhibit. Five out of these 18 visitors, however, found the

medium of the block to have a negative effect on their interest, feeling that the blocks

suited children more than adults, finding other means of getting information more

interesting (Figure 22).
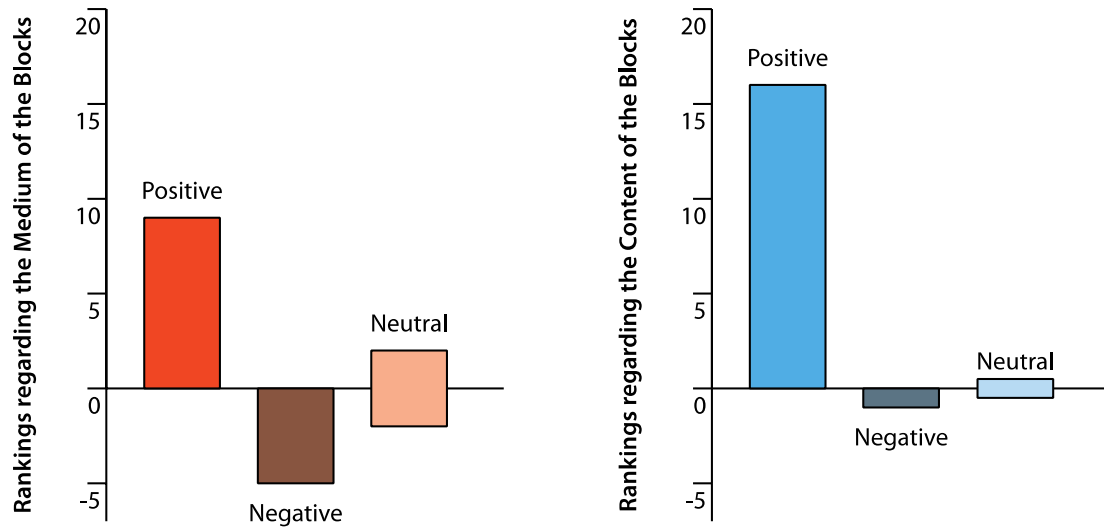
Figure 22. Graphs displaying the visitor rankings for the blocks with regard to both blocks medium and blocks content.

While just as many visitors (n=18) mentioned the block's content in relations to their interest in the interactive exhibit, the near majority of these responders (n=16) rated overwhelmingly positive reactions to block content, two responders (n=2) reported lack of positive response to block content, one visitor noting the advanced level of information for her young children, and one who found the blocks of neutral interest (Figure 22).

The Age Demographic Factor

In considering age groups as a way to separate the evaluation data, some interesting patterns emerge. Of the 30 interviews, 20 instances consisted of adults only, 4 instances involved teenagers (either alone or with adults), and 6 instances involved children with adults and/or teenagers. Though a small demographic overall, the blocks struck great success among the teenagers surveyed. Each interviewee in this group

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initiated in self-motivated play with the blocks during timing and tracking observation, and ranked the interactive exhibit positively in terms of interest. These teen users also unanimously connected the blocks to both artifacts and people, did not find the blocks confusing at all, and only suggested improvements in the increase of labeling and information on the blocks (Figure 23).
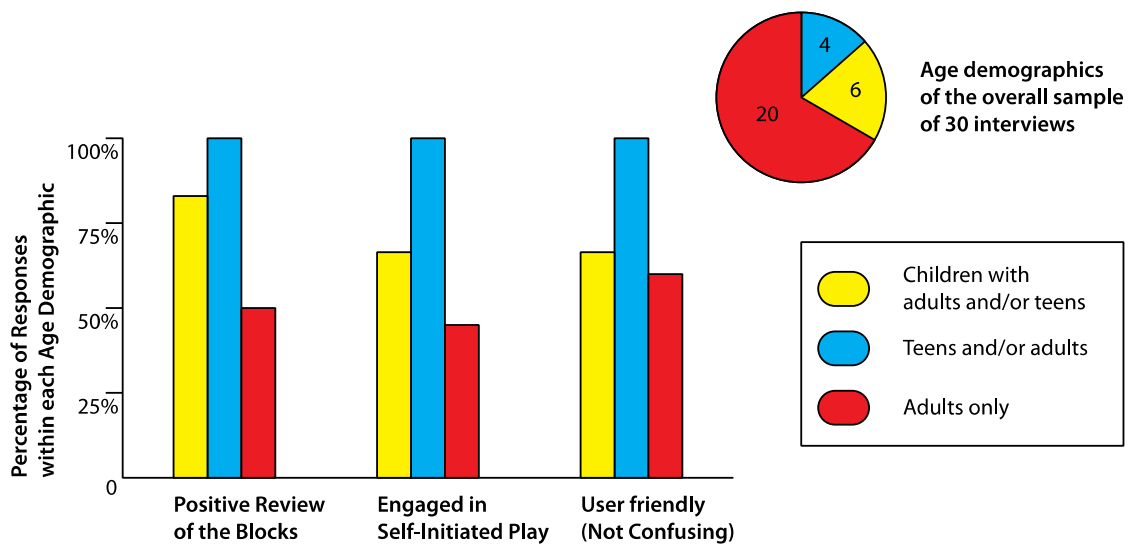
Figure 23. Graph illustrating Age Demographics information with regard to both visitor responses and the size of each of the three age demographic groups.

In the instances involving children, users engaged with the interactive exhibit but with more varied behavior as a result. Complications with this demographic group include not only the cognitive skill range with children (some young children not able to read), but also the overarching impact of parental bias and interest as well. In two cases parents called away children who started playing with the blocks to look at something else. In two other instances, the parent closely escorted the child throughout the observation period and the adult did not take notice of the blocks.

Even with these factors in mind, the blocks still showed strong signs of success with this group in all but one interview ranking the interactive exhibit positively, and strong connections to the appliances and to the history in this section of the exhibit. Two-thirds of this group (n=4) engaged in self-initiated play, and two-thirds (n=4) of this group found no difficulties or confusion with the blocks (Figure 23). I note here that I observed two of the highest cases of engagement with this group, including the only visitor that hit all four codes marked for block communication (the ten year old girl mentioned earlier in this analysis) and the family group that actively worked together to match the puzzle and answer questions.

In adults only surveys the responses varied greatly. All six of the negative reviews of the interactive exhibit resulted from adult interaction with the blocks with responses ranging from dislike of the blocks and activity, preference for another medium, or lack of awareness of the presence of the blocks. On the other hand, some adults found the blocks rather interesting (among them notably six women in their 20s), matching the puzzle, talking with each other and, in one case, a visitor who spent almost two minutes by herself playing with the blocks. Even in the adult only interviews, almost half (n=9) participated in self-initiated play (Figure 23). Not surprisingly, such examples of on task conversation at an exhibit and spending longer amounts of time actively participating with an exhibit stand as attributes of Active Prolonged Engagement according to the Exploratorium (Gutwill, 2008 p 7,11).

While this interactive exhibit still has room for improvement, it appears successful in reaching its target audiences of fifth, eighth and eleventh graders based on

the sample taken. It displayed the opportunity for high engagement in the case of some groups, and a majority of users found it to be user friendly. Most importantly, five out of six visitors thought more about the connections among objects, people, and commerce of the time period. During their stay, visitors identified objects, noting the role of electricity in these objects, and thinking about how these objects changed the lifestyle of the people who used them.

CHAPTER V

REFLECTING ON THE EXPERIENCE

In reflecting upon the results drawn from my constructivist history interactive

exhibit experiment and the research based theory that propelled it, a number of

considerations come to mind. Was this interactive exhibit successfully constructivist?

Were visitors participating in a process of "doing" history or interpreting historical

events? Did this offer a potential solution to the visitor engagement/object involvement

dilemma facing history museums today? As the results of this interactive exhibit

evaluation showed, visitors engaged with the material and thought about content related

the objects on display. Within the limitations of my research, then, I successfully reached

the goals for this interactive exhibit.

I maintain that this interactive exhibit represented success in a hybrid

Constructivist-Discovery Learning approach in that it generated open-ended, general

content related behavior. Visitors made different interpretations of the information and

used the interactive exhibit in multiple ways (such as reading blocks individually as

opposed to matching them to form a larger image) in researching the block puzzle

content. In the case of some visitors, I observed attributes of Active Prolonged

Engagement (documented aspects of constructivist engagement), including involvement

from different backgrounds, spending a longer amount of time in the exhibit, leaving the

exhibit for extrinsic reasons, and on-task conversation while participating at the exhibit
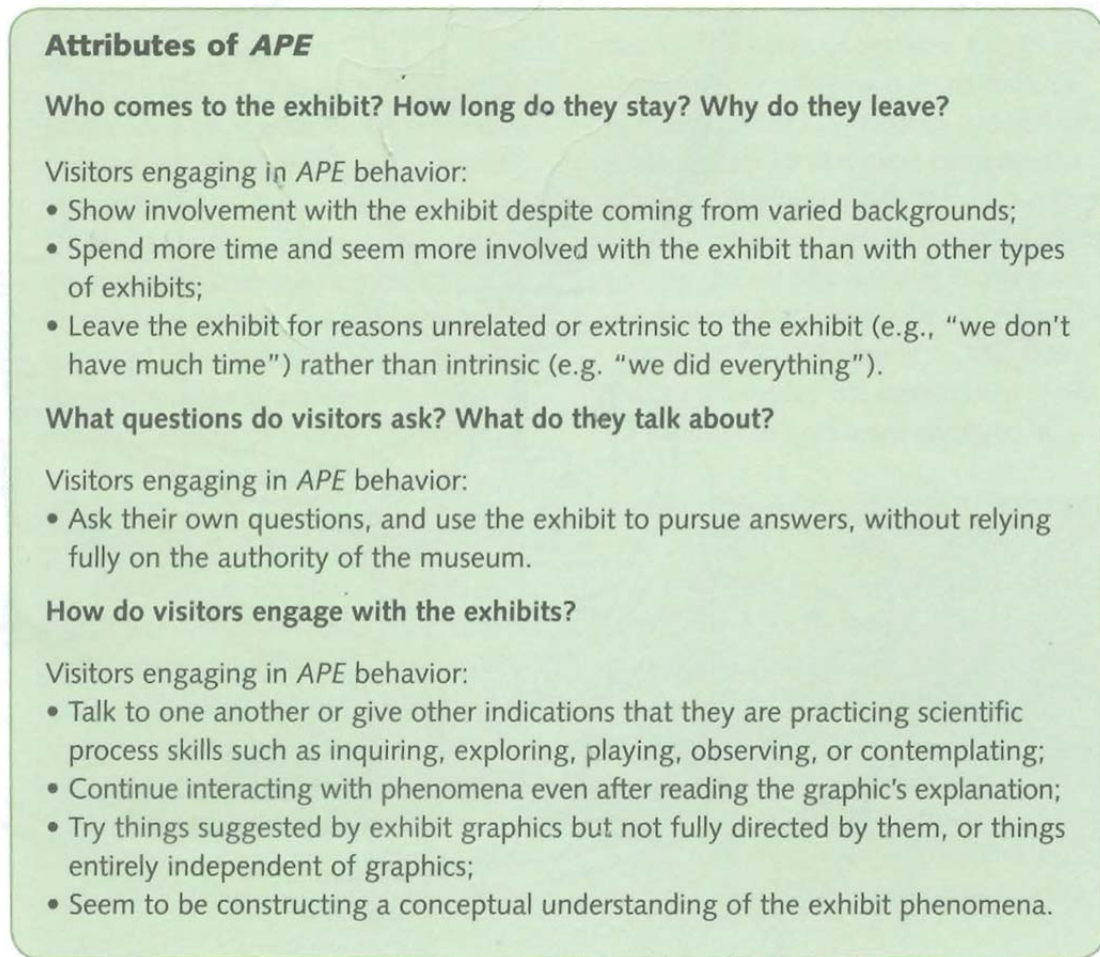
(Figure 24).

Attributes of *APE*

Who comes to the exhibit? How long do they stay? Why do they leave?

Visitors engaging in *APE* behavior:
- Show involvement with the exhibit despite coming from varied backgrounds;
- Spend more time and seem more involved with the exhibit than with other types of exhibits;
- Leave the exhibit for reasons unrelated or extrinsic to the exhibit (e.g., "we don't have much time") rather than intrinsic (e.g. "we did everything").

What questions do visitors ask? What do they talk about?

Visitors engaging in *APE* behavior:
- Ask their own questions, and use the exhibit to pursue answers, without relying fully on the authority of the museum.

How do visitors engage with the exhibits?

Visitors engaging in *APE* behavior:
- Talk to one another or give other indications that they are practicing scientific process skills such as inquiring, exploring, playing, observing, or contemplating;
- Continue interacting with phenomena even after reading the graphic's explanation;
- Try things suggested by exhibit graphics but not fully directed by them, or things entirely independent of graphics;
- Seem to be constructing a conceptual understanding of the exhibit phenomena.

Figure 24. APE attributes chart from page 7 in the Exploratorium's APE Publication.

As for participation in a process of "doing" history, as Russick (2010) would put

it, visitors showed signs of informal involvement with material and media culture. While

the instructions I developed could have been more concise (and possibly read more often)

for visitors to become a historian for purposes of the exhibit interactive, I maintain that

they thought about history and the function and symbolism of the objects on display. Media culture analysis, particularly present with the utilization of vintage advertisements in the blocks, aided visitors in thinking about why customers of the past might buy and use these objects. Two interviewees notably remarked on the *domestic woman* overtones of the advertisements while discussing their thoughts on the interactive blocks.

Visitors used the images and descriptions of objects along with the descriptions of customers to draw their conclusions on what people did with the objects during the time period. While not strictly Prownian, this use of objects as sources for history has overlaps with material culture, particularly when the visitor connected the blocks with the artifacts on display (an activity in which more than a third of users engaged), due to the close proximity of the artifact case as well as the nature of the blocks design. The interactive exhibit also successfully reached the goals of the Levine Museum staff as well. The interactive exhibit showed the highest level of success among the teens and older children I interviewed, meeting well the Museum's target audience of fifth, eighth, and eleventh grade visitors. Users of the interactive exhibit also identified objects, made connections to the concept and circumstances of electricity and technology in and around those objects, and speculated how objects might have changed the lifestyles of their users.

Despite these successes, there remains some room for improvement in this interactive exhibit, as well as related research. My research inherently had degrees of limitation, including a small sample size, lack of advanced recording equipment (such as video cameras or microphones), and the timetable in which I conducted the research with the assistance of the Levine staff.

One concern arose during the evaluation phase of the project that no one kind of exhibit indicates a "one size fits all" approach, a concern echoed by roughly one sixth of users (n=5), who did not connect with the interactive at all. This group included some visitors who could successfully use and understand that exhibit, a few of whom self-initiated participation with the exhibit. A few users found the non-linear/ constructivist approach to history frustrating, while others disagreed with the blocks as a medium for the interactive. Other visitors still preferred different means of finding information from the exhibit, whether by looking at labels on the wall or simply encountering the objects on display, unencumbered by interactive activity.   In light of the interpretation/ preservation dialectic of museums, the objects themselves represented the highest competition for attention to the interactive (with 100% of those interviewed noticing them) from the interactive exhibit designed to support them.

This issue raises the question that while history museums may be theoretically ready for constructivist interactive exhibits, some history museum visitors might not appreciate them. While some visitors did express excitement over being able to "play" with something and seeing an "interactive" at the museum, other visitors flat out requested the information on a label instead. Taking both this and the parental escorting in mind, Falk's (2008) theory of visitor identities, and how a visitor's internal expectations for a museum shape their experience might explain the varied responses. If a visitor believes that history museum serves a place to read wall labels and to point at the artifacts in the case, an interactive exhibit (particularly one designed to engage at the

depth of constructivist science interactive exhibits) might not fit in their picture of a history museum visit.

Recent experiences and expectations of visitors might also explain some of the age discrepancies found in evaluating the exhibit. For some reason, a significantly higher level of confusion about how the blocks functioned persisted in the adult only groups as opposed to the teenage and child user groups. Yet as some adults put it, they do not usually "play with blocks," instead associating such leisure activities that involve matching puzzles with color and word cues with children. Also the older children and teenagers interviewed tended to answer survey questions in a test like manner, ("The way the industrial revolution benefited the citizens of Charlotte"- teenage boy) as opposed to the more casual responses of adults ("Just walked around, read the things." – middle aged woman). If school aged children and teens pick up on such cues and analyze information in terms of puzzles and educational activities, this might explain a higher success rate with this interactive exhibit.

There exist a number of potential avenues for further study in light of this research, notably the application of my approach of material culture and interactivity in the development of another interactive history exhibit, one with different content and audience goals and a different context. In terms of design, I could or other exhibit designers could investigate plenty of alternatives for Constructivist-Discovery Learning activities, both in terms of media form and exhibit function. High tech media, for example, presents a different set of impressions on visitors than the low-tech blocks, with each medium carrying its own issues of representation and corresponding meanings, as

Hebdige (1979) might say. In light of the age discrepancy issue, I remain particularly curious on the possible development of a constructivist-discovery activity inspired by and relating to an adult leisure skill set in order to better engage with an adult audience.

I should also note that while this study focused primarily on the practices of science and history museums, the depth of research generated in the field of children's museum practice could contribute a great deal in to further development of this constructivist interactive exhibit design approach. Not only would it provide a useful viewpoint as to how leisure and cognitive activities vary by age group, but also children's museums themselves often embrace a range of subject matters and visitor behaviors in a constructivist early education fashion.

Children's museums also carry with them a different set of visitor expectations than history museums due to the high number of interactive components within their exhibition spaces. Another potential avenue for exploration would be how the quantity of interactive exhibits within a museum can affect or change visitor expectations within a space. If the Levine Museum of the New South for example had a dozen sets of puzzle blocks throughout their exhibition, what might have been missed by a visitor the first time might be noticed upon the second or third time. This study has successfully proven the possibility for installation of relatively low cost constructivist interactive exhibits into pre-existing design spaces. With proper funding and opportunity to fabricate, an investigation to study the effect of multiple interactive installations of this nature seems in order.

In the end however, I believe that the applications of my approach in the development of a constructivist interactive history exhibit provided a solution to the visitor engagement and object involvement dilemma posed as the research question. This use of research inspired interactive exhibit criteria in combination with material and media culture methodologies resulted in an exhibit that generated constructivist behavior related to displayed objects in 83% of the museum visitors interviewed. Such results prove this approach as a potentially useful addition to the exhibit developer's toolbox for history museums.

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Blocks Evaluation Tool 2.17.12

Tracking and Timing

Total Time in area: _____   Time of day:_____

Interview #   Date:

Group Type: Adult only   Adult + kid   Adult+ teen   A+K+T   Teen   other

Group Size: 1   2   3   4   5 +   organized group

Gender		Age Group						
Male Female	10-12	13-17	18-20s	30s	40s	50s	60+
Male Female	10-12	13-17	18-20s	30s	40s	50s	60+

Observations (Write down what you observe the visitor doing)

Interview

Hi my name is Kathryn and I 'm a graduate student working with the Levine Museum. We're trying to get feedback from visitors about this room and I was wondering if I could ask you a few questions about your experience.
- Yes, that's great.
- No, have a great day

Questions

1. Is this your first visit to the Levine Museum?   **Yes   No**

2. Can you tell me a little bit about **what you did** in this room?

3. In your opinion, what do you think this room is **about or trying to show**?
(probe: can you say more about XXXX? Anything else?)

4. Did you use or see the…
    Blocks   **Yes   No**
    Artifacts   **Yes   No**
    Exhibit labels **Yes   No** Did you get a chance to read it? **Yes   No**

5. What **connections**, if any, did you make between the blocks, artifacts or labels in this room? *(probe: can you say more about XXXX? Anything else?)*

(About the blocks)

6. **(If yes)** What do these blocks communicate to you, if anything?

   (**If no**) Can you take a quick look at it? What do these blocks communicate to you, if anything? *(probe: can you say more about XXXX? Anything else?)*

7. How interesting were these blocks to you? (Have them choose one)
Not interesting   Somewhat Not interesting   Neutral   Somewhat Interesting   Interesting

   7a. Why is it _____? *(probe: can you say more about XXXX? Anything else?)*

8. Was anything **difficult or confusing** about the blocks?

9. Do you have any suggestions on how we can make the blocks better?