Evaluating the Effectiveness of Hands-On-History

at Her Majesty's

TOWER OF LONDON

Evaluating the Effectiveness of Hands-On-History at Her Majesty's Tower of London

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Abstract

This research paper was written for Her Majesty's Tower of London to evaluate the interactive exhibit Hands-On-History. Various methods, including surveys, observations, interviews, and counting visitor flow rates were used to assess the exhibit and the individual displays. The criteria for the assessment were visitor enjoyment, visitor learning and exhibit attendance. The results from our qualitative and quantitative research methods were analyzed to determine that Hands-On-History is an effective exhibit.

Authorship Page

This project involved a great deal of collecting and analyzing data as well as writing about the conclusions and findings we discovered. Without each team member's input and considerable amount of contribution, this project would not have been completed efficiently. Although the report was often split up, no individual member took all the credit for a certain area because every piece of writing was circulated among the team to be revised. The following sections of the paper were originally written individually before being revised and re-written by the rest of the team:

Natasha Deschene: 2.4.3 of background section, 3.1.3 and 3.1.4 of methodology section, co-wrote 4.2 and 4.3 of results and analysis section, co-wrote 6.0 recommendations

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Max Kuhns: 2.1 and 2.3 of background section, 3.2 of methodology section, co-wrote 4.1 of results and analysis sections

Stephen Shin: 2.4 of background section, 3.1.2 of methodology section, co-wrote 4.2 and 4.3 of results and analysis section, co-wrote 6.0 recommendations

Any sections of the report not mentioned above were written collectively by the whole team.

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Executive Summary

The Tower of London is a museum and historic visitor attraction that handles more than two million visitors annually, and is recognized by the United Nations as a World Heritage site. Many museums have implemented interactive exhibits as an alternative to the traditional types of displays, and the Tower of London is no exception. In August 2007 the Royal Armouries, the organization that oversees the Tower's collection and displays, opened an exhibit titled "Hands-On-History." This collection of interactive displays is located on the top floor of the iconic White Tower, and is intended both to entertain and to educate.

The Royal Armouries invested a considerable amount of time, effort, and funds in designing and constructing the exhibit, but they did not create any standard way of assessing its success or seeking visitor feedback. Since the reception of the exhibit by visitors was important to the Royal Armouries, our project's aim was to provide them with an assessment of the success of the exhibit and its individual displays in the areas of attendance, educational value, and visitor enjoyment.

In order to guide and concentrate the research efforts, two objectives were developed. The first objective was to determine the response of visitors to the exhibit. To complete the objective we used four methods. The first method was to create a survey to determine visitor enjoyment and visitor learning. We surveyed visitors by reading them questions and recording their answers as they exited the exhibit. The second method was to observe visitors as they went through the Hands-On-History exhibit. These observations allowed us to determine which displays visitors attended, interacted with, commented on and read the label to most. Our third method was to observe the individual displays and record the comments visitors made, any areas of confusion, and the patterns of their interaction. Finally we interviewed a group of special needs students to determine how accessibility affected a visit to Hands-On-History. These methods were used to determine enjoyment and learning within the exhibit.

The second objective was to determine flow rates within the Tower of London. We counted the number of visitors entering the White Tower, entering the Hands-On-History exhibit and those who entered the exhibit and immediately exited. We also obtained the number

entering the Tower of London from the Yeoman Guards. From these numbers we were able to determine the number of people who viewed one or more displays within the exhibit.

Determining visitor flow rates and visitor response provided us with a broad body of data, some of which was quantitative and some qualitative. In order to evaluate the exhibit, we analyzed the data according to three measures of effectiveness:

- Exhibit Attendance
- Visitor Learning
- Visitor Enjoyment

Exhibit Attendance

When determining an exhibit's effectiveness in terms of attendance, museum researchers have suggested that more than half of museum visitors should attend an exhibit in order for it to be considered effective. This standard is called "attracting power," and Hands-On-History performs well against it. By subtracting the number of visitors who immediately exited the exhibit from the number of visitors entering it, we determined the number of visitors who attended it. We divided this number by the total number of visitors to the Tower of London and the White Tower, which revealed:

- 56.7% of visitors to the Tower of London attended the exhibit
- 76.6% of visitors to the White Tower attended the exhibit

The way in which visitor attention was shared among the nine displays of the exhibit also gave evidence of its effectiveness. Among the individual displays, we found that "Norman Power" was the most attended and that "Fire Power" was least attended. Another common standard of effectiveness is that more than half of the visitors attending an exhibit must attend more than half of its displays. We found that Hands-On-History exceeded this standard with 88% of visitors to the exhibit attended more than half of its displays and 33% of these visitors attended all of its displays.

Visitor Learning

Hands-On-History was also evaluated in terms of how well it educates visitors to the Tower of London. We surveyed over 750 visitors and determined that 87.3% of them had felt

they had learned something after viewing the exhibit. This is a very high percentage considering most of the visitors who hadn't learned were history majors, history teachers or visitors who had already been to the exhibit in the past. When the visitors were asked if they could provide an example of something they had learned, 67.1% of the visitors surveyed identified an example of something specific that they had learned. These percentages demonstrate the effectiveness of the exhibit in the criteria of education.

The data explained above report the exhibit's performance for all visitors, but a more detailed analysis of learning in terms of demographics was also carried out. The evidence from our surveys and observations showed that neither age nor language affected learning. However, one demographic that was found to have an influence on learning was gender. Males spent a longer average time at almost all of the displays and read more of their labels than females did. A longer time spent at an exhibit, also known as "holding power," is correlated to an increase in learning (Donald 1991).

Visitor Enjoyment

Although the purpose of museums is to provide the public with an education of the past, the Royal Armouries has created an exhibit to focus not only on education, but also on providing enjoyment. Our survey results showed that 98.0% of visitors to Hands-On-History stated that they had enjoyed the exhibit. The effects of different demographics on enjoyment differed significantly from learning. Where age had no effect on learning, it did significantly impact visitor enjoyment. It was discovered that youths enjoyed the exhibit more than adults, with the self-reported level of enjoyment slightly decreasing with each increase in age range. Enjoyment in terms of gender only differed in youth under the ages of 20. We found from our data that males under the age of 20 enjoyed the exhibit more than females under the age of 20. In general, they had a higher level of interest increasing their overall level of enjoyment. In addition, language preference had no major effect on reported levels of enjoyment.

The exhibit is made up of individual displays and we analyze how some displays were more effective than others in terms of enjoyment, learning and attendance. "Heading for Trouble," "Norman Power," and "Right on Target" were found to be the most effective exhibits overall. These top three displays were where visitors spent the most time, visited most

frequently and commented on enjoying most. "Aiming High" and "Fire Power" were the least effective displays. "Fire Power" was ignored most often and had less than 1% of the population state that it was their favorite. "Aiming High" had no influence on visitor learning and was the second least enjoyed exhibit.

Recommendations

Our analysis reveals that the exhibit is effective. However, there are actions that could be taken to improve this already successful exhibit. Lack of prior knowledge of the exhibit is an area of concern for the Royal Armouries; only 6.3% of visitors knew about Hands-On-History before they entered the White Tower. Of this small percentage, the majority of the visitors had only heard of the exhibit because they had been there before. Several visitors were observed leaving the exhibit commenting to a family member or friend that they wish they had known about this exhibit, because they would have factored in more time to view Hands-On-History. Therefore, we recommend an increase in advertising at the Tower of London site and in nearby areas.

A second recommendation that would help in aiding visitors' awareness of the Hands-On-History exhibit would be to relocate it to the first floor of the White Tower. By counting visitor flow, we found that about 15% of visitors who entered the White Tower did not make it up to the top floor exhibit – Hands-On-History; most of these visitors were either unaware of the exhibit, were too fatigued or unable to make it to the top, or did not have enough time to view the exhibit. By relocating the exhibit, it would not only attract a larger population of visitors into the exhibit, it would also allow more visitors with physical handicaps to access the exhibit.

Within the individual displays of the exhibit we recommend the removal of the display "Fire Power." The video is not fully explained, certain aspects of it are not in historical context and the display requires no interaction. We also suggest adding a second bow to the display "Right on Target." This would decrease the crowd and allow more visitors to interact.

Our final recommendation is to increase the number of interactive exhibits because Hands-On-History is so effective. Visitors commented that they would love to see more interactive display throughout the Tower, if not for their own enjoyment than at least for children.

By increasing the amount of interactivity and spreading it out throughout the Tower, there would be reduced crowdedness allowing all visitors a chance to experience history hands-on.

Overall Assessment

Based on analysis of the data we collected, Hands-On-History is an effective exhibit. We found that 56.7% of visitors entering the Tower of London view one or more displays in Hands-On-History; and of those visitors one-third of them viewed all nine displays in the exhibit. Our analysis also showed that 98.0% of visitors enjoyed the exhibit, 87.3% of visitors felt they had learned something, and 84.8% want to see more exhibits similar to Hands-On-History. Very few exhibits or museums would be able to match these high levels of visitor attendance, learning or enjoyment (Hein 1998).

Table of Contents

Abstract i
Authorship Page ii
Acknowledgments iii
Executive Summary iv
List of Figures xi
List of Tables xii
1. Introduction 1
2. Background 3
2.1 Overview of Museums 3
2.1.1 Motivations for Museum Visits 4
2.1.2 Exhibiting in Museums: Old Displays and New Techniques 5
2.1.3 Teaching Styles and Presenting Information in Museums 6
2.2 The Tower of London: Age-Old Fortress, Modern Museum 7
2.2.1 History of the Tower of London 8
2.2.2 Museum History 9
2.2.3 The Royal Armouries 10
2.2.4 Hands-on History: Exhibit in Question 11
2.3 Comparable Exhibit and Museum 13
2.3.1 Higgins Armory 13
2.3.2 Transportation Museum 15
2.3.3 Science Museum 15
2.3.3 Tower Bridge Engine Room 17
2.4 Demographic Factors that Affect Museum Experiences 17
2.4.1 Age 18
2.4.2 Gender 19
2.4.3 Cultural Differences 19
2.4.4 Special Needs and Handicaps 20
3. Methodology 21
3.1 Objective 1: Determine Visitor Response 21
3.1.1 Surveying Visitors 21
3.1.2 Observing Visitors 26
3.1.3 Observation of Individual Displays 27
3.1.4 Interviewing Special Needs Students 28
3.2 Objective 2: Determine Flow Rate 29
4. Results and Analysis 30
4.1 Visitor Attendance 30
4.1.1 Attendance of the Exhibit as a Whole 30
4.1.2 Attendance within the Exhibit 37
4.2 Visitor Learning 39
4.2.1 Exhibit as a Whole 39
4.2.2 Individual Displays 42
4.3 Visitor Enjoyment 45

4.3.1 Exhibit as a whole 45
4.3.2 Individual Displays 48
4.3.3 Desire for more interactivity 53
4.4 Summary 55
5. Recommendations 58
5.1 Awareness of Hands-On-History Exhibit 58
5.2 Desire for More Interactive Exhibits 59
5.3 Improving the Individual Displays 59
5.4 Areas of Further Research 60
6. Conclusion 63
Bibliography 64
Appendix A 66
Appendix B 82
Appendix C 91
Appendix D 92
Appendix E 93
Appendix F 94
Appendix G 95
Appendix H 96
Appendix I 97
Appendix J 98
Appendix K 101
Appendix L 107
Appendix M 112
Appendix N 114
Appendix O 118
Appendix P 119
Appendix Q 120
Appendix R 121
Appendix S 122
Appendix T 123
Appendix U 124
Appendix V 125
Appendix W 126

List of Figures

Figure 1: The White Tower 8
Figure 2: Diagram of the Tower circa 1270 9
Figure 3: Overhead Schematic of Hands-On-History Exhibit 11
Figure 4: Quest Gallery Helmets at Higgins Armory 14
Figure 5: Comparing Visitor Flow Rates on an Average Day 32
Figure 6: Visitors Entering the White Tower 33
Figure 7: Visitors Entering Hands-On-History 34
Figure 8: Visitors Immediately Exiting 35
Figure 9: Attendance of Individual Displays by Exhibit Visitors 37
Figure 10: Average Time (male vs. female) 41
Figure 11: Reading labels (male vs. female) 41
Figure 12: Responses of Learning 43
Figure 13: Average time spent (Youth vs. Adult) 44
Figure 14: Manipulation of displays (Youth vs. Adult) 47
Figure 15: Favorite Displays 49
Figure 16: Manipulation of Displays (Male vs. Female) 51
Figure 17: Percentage of Overall Population Wanting More Interactivity 53
Figure 18: “Timelessness of Armor” display 101
Figure 19: “Samurai” display 101
Figure 20: Greco-Roman Helmets 102
Figure 21: Full-Scale Crusader and Horse in the Great Hall 102
Figure 22: Suits of Armor left 103
Figure 23: Suits of Armor right 103
Figure 24: Pikes along one wall of the Great Hall 104
Figure 25: Full-scale mock sword battle 104
Figure 26: Miniature of Swiss battle 105
Figure 27: Early European crossbow 105
Figure 28: Stairwell exit of the Great Hall 106
Figure 29: “Norman Power” 107
Figure 30: “Dead on Target” 107
Figure 31: “Heading for Trouble” 108
Figure 32: “Medieval Arms Race” 108
Figure 33: “Majestic Might” 109
Figure 34: “Aiming High” 109
Figure 35: “Trigger Happy” 110
Figure 36: “Firepower” 110
Figure 37: “Threat and Response” 111
Figure 38: Percentage of Visitors who Read Labels (Youth vs. Adult) 124
Figure 39: Average Time Spent at Each Display by the Overall Population 125

List of Tables

Table 1: Percents Relating Visitor Flow through Various Points in the Tower 31
Table 2: Percent of Visitors Entering the Exhibit that Immediately Left 36
Table 3: Percentage of people who felt they learned 40
Table 4: Percentage of age groups that enjoyed the exhibit 46
Table 5: Total average time spent through HOH by age group 47
Table 6: Top Three Favorite Displays by Age Group 52
Table 7: Percentage of Visitors Who Want More Interactive Exhibits 54
Table 8: Effectiveness of Individual Displays 56
Table 9: Demographic Break-Down of Enjoyment 119
Table 10: Percentage of people who said each display was their favorite (by gender): 120
Table 11: Percentage of people who said each display was their favorite (by age): 121
Table 12: Percentage of people who said each display was their favorite (by language): 122
Table 13: Visitor's Most Disliked Displays 123
Table 14: Total Counting Numbers 126
Table 15: Counting March 26th, 2008 126
Table 16: Counting April 4th, 2008 126
Table 17: Counting April 8th, 2008 126
Table 18: Counting Average of All Three Days 126

1. Introduction

Museums preserve artifacts of historical importance and provide the public with an understanding of the past (Diamond 1999). This is accomplished by educating visitors through various types of exhibits and displays. The exhibits illustrate to visitors the contemporary effect of historical successes and failures by presenting artifacts, artwork and written material. The classical style of display employed by museums shows these objects or works of art in glass cases, with a caption describing them nearby. This style of display is commonly used, but more recently museums have also found ways to entertain and educate through the use of interactive exhibits.

Museums have implemented interactive or hands-on exhibits involving the use of audial, tactile and visual techniques as an alternative to the traditional types of displays. "Interactive exhibits have been a mainstay in museums for more than three decades, seen as a way of improving learning by increasing visitor involvement" (Hafner 2004). Ideally, museums employing these interactive displays would be able to easily assess the experiences of their visitors and the educational value of those displays. They would check that a majority of their visitors were attending those displays, and they would also check visitor responses against criteria such as enjoyment and learning. Unfortunately, many museums do not have standard practices for evaluation, nor do they have ways to receive visitor feedback.

One assessment of visitor response *was* completed on an interactive exhibit at the Tower of London. This assessment showed that 64.0% of the visitors found that exhibit to be very educational and 65.0% found it to be very interesting (Clark et. al. 2005). While this team investigated enjoyment and the educational value, they did not analyze aspects of attendance including visitor flow into the White Tower and the percentage of visitors who attended the exhibit.

The Royal Armouries has invested a considerable amount of time and effort into building and maintaining a new interactive exhibit called Hands-On-History. However, they have not established a viable means of determining the exhibit's educational value and have no feedback of its appeal to visitors. Our team aimed to perform an in-depth assessment on the current Hands-On-History exhibit.

The task of this team was to provide the Royal Armouries with a useful summary of the strengths and weaknesses of this new exhibit and its individual displays in the areas of attendance, educational value and visitor enjoyment. The team collected and analyzed data to assess how the museum should respond to the visitor feedback, and then presented this information to the Royal Armouries at the conclusion of our assessment. The data was gathered through surveys, interviews, and observations. As the curator of the Higgins Armory Museum noted, these methods are necessary because the analysis requires the response of the visitors rather than simple observation of the exhibit itself (Forgeng 2008). Our analysis of visitor feedback will give the museum the information needed to understand and improve their already effective Hands-On-History exhibit.

2. Background

This chapter will provide the reader with an understanding of the context and the information used to complete this project. The chapter will describe museums, covering their purpose, types of displays, and styles of teaching. It will then describe the history of the Tower of London complex as it moved from being a fortress to a modern museum. The museum and its operating agency, the Royal Armouries, will then be described, followed by a detailing of the displays in the Hands-On-History exhibit itself. Exhibits from other museums comparable to the Hands-On-History exhibit will then be discussed. Finally, the chapter will discuss the influence visitors' backgrounds have on their museum experiences.

2.1 Overview of Museums

On their website, the International Council of Museums (ICOM) defines a museum as a "permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment" (ICOM Statutes, 2005). This fits the general idea of a museum. In addition, one of the ICOM requirements is that a museum be a non-profit entity. This requires that the funds the museum takes in be used for the preservation and acquisition of artifacts and exhibits, as well as expansion of the museum in order to better educate the public. Any good museum is also thought to fulfill at least one of three functions (Wittlin, 1970):

1. to be a safe and responsible depository endeavoring to preserve and conserve objects of a given historical, natural, cultural, or intrinsic value
2. to be a center of research regarding the material they exhibit
3. to serve as an educational organization for the general public

While museums try to fulfill these functions, they have morphed, diversified, and specialized into a vast array of institutions (National Endowment for the Arts, 1975). This diversification allows a museum to better focus on the material it is presenting. Museums can range from enormous umbrella institutions, like the Boston Museum of Science, to very small,

specialized collections, like the Franklin D. Roosevelt American Heritage Museum, housed in Union Station in Worcester, Massachusetts. While museums have diversified into their respective areas of study, they continue to share the common thread outlined by ICOM – to house and maintain historical and modern artifacts, specimens, and inventions, which are regarded as important, beautiful, rare, or entertaining.

While most people focus on the exhibits inside a museum's walls, many do not realize that the largest exhibit a museum can offer is the building itself. Art museums have strived to establish their place among the most aesthetically pleasing facilities in the world (National Endowment for the Arts, 1975). The most striking examples are the modern art museums that have transformed their facades into strikingly gorgeous pieces of art in their own right. Buildings such as the Guggenheim Museum in New York City, the Milwaukee Art Museum, and the Louvre in Paris have allowed their buildings to express the aesthetic feeling captured by the art inside (Frommer's, 2007) (Schultze, 2001). History museums, however, have long been using the buildings they are in as their largest exhibit. Many of these museums are found inside historically important buildings, such as the White Tower in London. In addition, an interesting phenomenon that has occurred in museums around the world is that their buildings have become historical artifacts due to the museums' presence. Many British museums were founded in the late Victorian era, and the buildings built to house them exhibit the classic architectural beauty of the time. Without the museums' presence these buildings may have been razed for modern development.

2.1.1 Motivations for Museum Visits

People visit museums for a number of different reasons and carry certain expectations about what they want to see and learn. The way a museum caters to visitors can greatly enhance the visit. The museum-going experience can be seen in six different aspects: as an educational endeavor, as recreation, as a social event, as a celebratory or honorary pilgrimage, as a cultural and spiritually enchanting event, and finally as an enriching or aesthetic experience (Kotler, 1998).

A museum's goal of educating the public is realized by the first aspect of a museum experience; the visitor yearns to learn something new. However, a strictly educational environment may not be appealing to most people. That is why museums want their patrons to

consider a visit a recreational or social event, since this type of environment is more likely to bring visitors back (Kotler, 1998). From a mother bringing her child to see the whale skeleton at Hawaii's Bishop Museum to a group of college students watching the world's largest Van de Graaff generator produce ten foot lightning bolts at Boston's Museum of Science, museums hope that a recreational and social atmosphere will bring visitors back time and time again (Bishop Museum, 2004; Museum of Science, 2007).

For many people, cultural heritage is an important aspect of their visit to a particular museum. In this way a museum visit can function as a celebratory or honorary event like a pilgrimage. A museum that exemplifies this type of visit is Graceland, the home of now-deceased musical artist Elvis Presley. "Since its opening to the public in 1982, millions of fans from around the globe have toured Graceland and its ancillary attractions" (Department of the Interior, 2006). Honoring the past and the people who made great is an integral part of a museum's purpose (Kotler, 1998).

The last two aspects of a visit to a museum can affect the layout of the museum and its exhibits more than anything else. Kotler suggests that people go to museums to become enlightened not just educationally, but culturally and spiritually (1998). The atmosphere inside a museum has a sense of sophistication and elegance that brings a new level to a visitor's mind and spirit. To bring on this sense of enlightenment a museum must rely on the displays' aesthetic presentation. Art museums obviously have beauty in mind, and history museums can captivatingly exhibit a piece that brings visitors back again and again. This part of museum visit is where the approach a museum takes to exhibit the item can greatly enhance the visit. The techniques employed, as stated by Kotler, whether they be the elaborateness or simplicity of the exhibit, or the senses engaged – sight, sound, or touch – can turn a mediocre exhibit into one that the museum visit wouldn't be complete without (1998).

2.1.2 Exhibiting in Museums: Old Displays and New Techniques

The way in which the information and exhibits are displayed in the museum is vital for adequate public understanding of the material the museum is presenting (Wittlin, 1970). The stereotypical view of a museum is of a very beautiful, very informative, very cold and dimly lit place filled with objects both interesting and valuable, both monetarily and historically. However, this view has been challenged as of late with exhibits that have diversified nearly as

much as the museums themselves (Belcher, 1991; National Endowment for the Arts, 1975; Royal Armouries, 2008). The earliest displays for specimens and artifacts were behind glass with a placard displaying a short summary or description of the piece. This type of display is still widely employed in museums today, especially for pieces of rare historical value, and those that are extremely valuable such as classical paintings or jewels, such as the Crown Jewels in the Tower of London (Royal Armouries, 2008).

Museums are now utilizing new techniques to educate the public. Interactive exhibits are becoming widespread throughout museums and buzz words such as "experiential learning" and "family learning" (Forgeng, 2008) have entered the museum curators' lexicon. These types of exhibits range from a simple glass case with a hole that you can stick your finger into to touch a moon rock to complex computer generated exhibits that allow museum goers to experience the thrill of a joust or firing an arrow (Royal Armouries, 2008). Also museums around the world are using large public exhibitions such as IMAX theaters and planetarium shows to entertain and educate the public in amazing new ways (Kotler, 1998).

An innovative way museums are sharing their information is through interactive online exhibits. The World Wide Web has allowed a few museums to bring their knowledge to countless numbers people who may not be able to physically visit the museum. Some new museums are actually located entirely in cyberspace. An example of one of these entirely virtual museums is LIMAC (Museo de Arte Contemporáneo de Lima) whose entire collection of artwork highlighting Peruvian artists is on a website (Liza, 2007). Other museums have created online links from physical interactive electronic exhibits that allow school children to access and experience the exhibits (In Focus Online, n.d.). Still other museums have created online communities of museums that link together museums around a country, or around the world, and allow them to share exhibits online (CHIN, 2008). Though becoming more and more popular, there are still realtively few online museums and exhibits.

2.1.3 Teaching Styles and Presenting Information in Museums

The way the museums present individual exhibits is almost as important as the material presented in the exhibit. Different teaching styles stimulated by different exhibit designs can better educate more of the public. Most people respond best to the three most common types of sensory perception – audial, visual, and tactile.

The most commonly used and easiest sensory input to relate to is visual perception. Museums have always relied on visual exhibits to show specimens and explain an exhibit with small placards. Charts, graphs, and maps have also been part of a museum's classical visual repertoire. Live exhibits and performances have been one of the most popular ways of educating museum goers (Belcher, 1991). More modern visual-based exhibits being used by museums are IMAX theaters and interactive computer kiosks. The interactive kiosks allow museum goers to tailor the information they receive at a museum to their personal preference.

New visual exhibits are not as educational and enjoyable without an audible portion to enhance the experience. An IMAX movie would not have nearly the impact it would normally have if it didn't have a soundtrack with it. Museums have also used sound in other ways, such as having a roar accompany a stuffed lion or a tyrannosaurus rex skeleton.

The tactile experience can be one of the most memorable types of teaching styles. Trying on an actual medieval knight's helmet, touching a moon rock, or feeling how rough real sharks' skin is can capture visitors' attention better than any placard. Museums have to manage these teaching styles so as to cater to the widest possible audience, while still keeping the exhibits informative and cultured (Belcher, 1991).

In summary, there are a variety of factors that can affect the quality of visitors' experiences when going to a museum. These include whether expectations are met, and whether exhibits are designed to appeal to them – the way they learn, etc. The Tower of London has begun to use more interactive approaches in exhibits and meet various expectations. In the next section we will describe the goals of this museum and its Hands-On-History exhibit.

2.2 The Tower of London: Age-Old Fortress, Modern Museum

The Tower of London, also known as Her Majesty's Royal Palace and Fortress, is actually a complex of structures. The Tower, as it is referred to throughout the paper, has served many different functions for the past millennia; it has operated as a fortress, a prison, a mint, a menagerie, an arsenal, and a royal residence. Most recently, the Tower has been used as a museum, displaying weapons and armor alongside the crown jewels of the Kingdom.

The displays in the collection are under the control of the Royal Armouries, the sponsor for this project. Though the building, the artifacts, and the topics on display date back quite far into history, the museum is modern, and those in charge of it strive to update its contents in order

to educate the wide range of visitors it receives. The Hands-On-History exhibit reflects this intent; it is relatively new and experimental, and attempts to reach its audience by engaging them physically as well as mentally.

2.2.1 History of the Tower of London

The Tower of London began as the castle of William the Conqueror in 1066 A.D. (Royal Armouries 2008). A recent picture of the first and most iconic structure to be built, the White Tower, is shown in Figure 1.

Figure 1: The White Tower
from Royal Armouries website

The castle was built apart from the settlements of the Anglo-Saxons William had conquered, and was surrounded by a moat to protect William and his invading Norman forces from foreign invasion as well as from revolt (Clark 2005). Expansions to the complex completed by later kings between its construction in 1066 and the most recent major addition in 1547 broadened the footprint considerably. The significance of the structure to the rulers and to the country increased in tandem through time. Figure 2 shows the White Tower surrounded by additions as of 1270 AD.

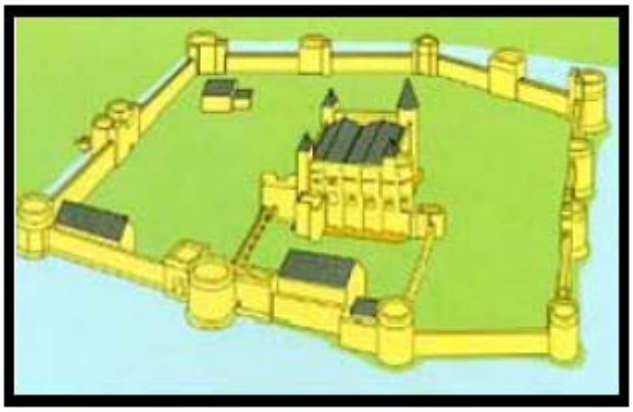

Figure 2: Diagram of the Tower circa 1270
from Clark

The power exercised by holding the Tower only increased in those centuries of development, along with the number of operations and practices carried out within its walls. The practice of holding high-profile prisoners began in the 12th Century (Clark 2005). The use of the Tower as a mint and a menagerie began in the 13th Century, and both practices continued for approximately 600 years (Clark 2005). By the 14th Century, the Tower housed an arsenal capable of supplying the entire English army and navy (Royal Armouries 2008). An Office of Ordinance was established by the early 15th Century that surveyed and distributed the arms of the Tower to the military; it expanded its roles over time to include testing and development of new equipment (Clark 2005).

According to the Royal Armouries (2008), "When Henry VIII came to the throne in 1509 he removed the medieval arms and armour and replaced them with up-to-date material." During the English Civil Wars around 1644, a number of suits of armour from Greenwich Palace were added to the Tower's collection (Royal Armouries 2008).

2.2.2 Museum History

Paying visitors were first allowed to view the collection around 1660. These visitors were mostly invited inside in order to impress them with the might of the arms collected there, and the Tower collection was not meant to be instructional or chronological. It was not until the early 20th Century that the Tower became a museum in the modern sense (Royal Armouries 2008).

In the early 1900s, the purpose of the museum experienced a significant shift. The central focus of its operators – then the Office of Works – became historical accuracy and the logical

organization of displays (Royal Armouries 2008). After several decades, the organization in charge of the Tower was given its modern title; "[In] 1985, Her Majesty the Queen consented that it should become the Royal Armouries" (Royal Armouries 2008). Since the collection had increased by this point to a much greater size than could be comfortably housed in the Tower facility, the Royal Armouries investigated new sites to spread out their artifacts and displays. The heavy artillery was moved to Fort Nelson in 1988. Many other items were moved to a new museum site in Leeds in 1996, leaving those displays and items most pertinent to the history of the Tower on site (Royal Armouries 2008).

2.2.3 The Royal Armouries

An evaluation requires criteria against which the exhibit to be evaluated can be measured. In order to establish criteria that will be useful in the evaluation of the Hands-On-History exhibit, it was important not only to investigate the history of the Tower, but also to understand the broad beliefs of the museum's operating agency.

From their own literature, the Royal Armouries' vision is to "help make Britain a safer place" (Royal Armouries 2008). Though the Tower is a showcase of the history of weapons, violence and military superiority, the museum strives to educate its visitors about the responsible use of modern weapons. The Royal Armouries promotes values of responsibility and respect, and addresses the issues of aggression and the misuse of weaponry, through exhibits and through traveling teachers and presentations (Royal Armouries 2008). Their self-reported mission is "to harness the reputation and relationships of their organization, the talents of their team, and the power of their brand to promote greater safety in all walks of life" (Royal Armouries 2008). Their objective is not just to teach history, but to teach responsibility through the examples of carelessness and aggression that history provides.

The Royal Armouries' mission of education can be seen as the underlying motivation for the changes made to the museum. In order to carry out this education, the Royal Armouries is attempting new ways to attract and teach visitors such as the introduction of interactivity. In interactive exhibits, visitors can do more than gaze upon the collection and read the labels surrounding it. The Hands-On-History exhibit, the second of its kind to be housed in the Tower, is one such exhibit.

2.2.4 Hands-on History: Exhibit in Question

The Hands-On-History exhibit, which opened in August 2007 (Royal Armouries 2008), is one of the newest additions to the Tower Museum. It is located on the third floor of the White Tower, and takes up about half of the floor space. Bridget Clifford, supervisor and contact for this team at the Royal Armouries, explained that the exhibit "offers visitors a view of the evolution of arms and armour – cross-bows, Kevlar, and much more – in an interactive setting that encourages touching, operating, and comparing" (Clifford, personal communication). Figure 3 shows an overhead view of the layout of the exhibit.

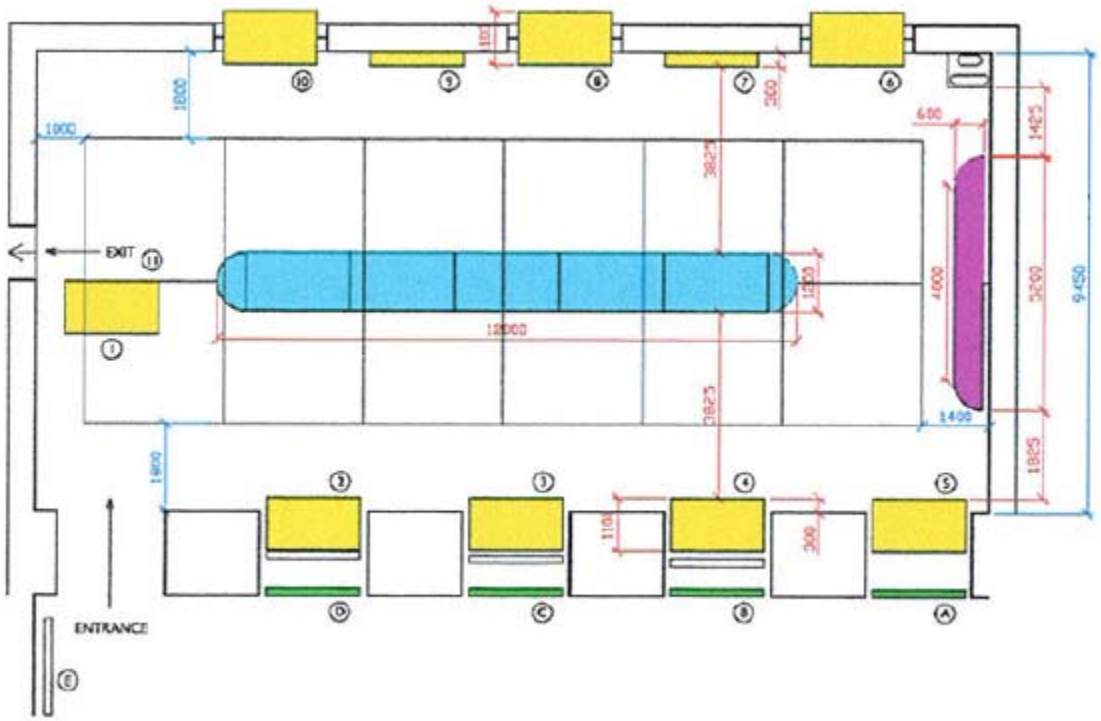

Figure 3: Overhead Schematic of Hands-On-History Exhibit
from Royal Armouries memo

As visitors enter the room they must follow a relatively linear path because the room has a central wooden divider at railing height. The walls of the room are lined with displays that move chronologically through history. Timelines are posted at the entrance and exit.

What sets the exhibit apart from other exhibits in the Tower is the amount of interactivity offered by some of the displays. Rather than simply presenting an object or fact, these displays provide visitors the opportunity to listen, touch, or perform an action that relates to the history

presented. One exhibit challenges visitors to pull back a long bow, and measures how accurately they could have fired one. Another display allows visitors to respond to a question by choosing the correct weapon for that situation. Yet another simulates wearing a medieval helmet into battle.

2.2.4.1 Displays in the Exhibit

1. Norman Power

   At this display, you are given a situation and asked which weapon – sword, mace, or axe – would be best suited for it. There are replicas of these weapons attached to the display. To respond, the visitor lifts the weapon they feel is correct. Afterwards, a light informs the visitor if they are correct or incorrect.

2. Right on Target

   This display contains a replica of a bow; the visitor pulls back on the bow and tries to release it at the correct tension to get a "dead on target" out of a range of possible levels of accuracy. The visitor must also keep in mind the direction of wind, indicated by an illuminated arrow.

3. Heading for Trouble

   Visitors can stick their faces into holes, and peer through the visors to view a video of a medieval battle from the point of view of a knight wearing a metal helmet.

4. Medieval Arms Race

   In this display, there are replica swords, gauntlets and horse reigns. The intention is for visitors to insert their hands into the gauntlets and grasp the swords and horse reigns in an authentic manner.

5. Majestic Might

   This display shows a model of Henry the VIII in a suit of armor, surrounded by various weapons. Touching a weapon gives a brief narrative description of how it would breach his armor.

6. Aiming High

Visitors can change the angle of a cannon and watch the ballistic trajectory of the cannon ball. Successful firings will hit a cartoon enemy group, which moves back and forth.

7. Trigger Happy

This display allows a visitor to pick up a model of a rifle from the 17th century to see how heavy it is.

8. Threat and Response

An image of a fusilier from the twenty-first century is surrounded by modern weapons and threats. Touching these items makes the soldier explain how they are used and their dangers.

Pictures of each of the displays can be seen in Appendix L and individual observations of each display are recorded in Appendix N.

2.3 Comparable Exhibit and Museum

One of the concerns expressed by the Royal Armouries was the similarity of their hands-on exhibit to other interactive exhibits. They wanted to compare the exhibit "with good practice in the U.S. and elsewhere in the museum world". They also wished to know our impression of the other museums with respect to the White Tower. In response, the team visited museums with collections similar in theme to the collection at the Tower of London.

2.3.1 Higgins Armory

The Higgins Armory in Worcester, MA, is one of the only armory museums in the United States. The museum was visited by our team on the 22nd of January, 2008, between the hours of 11:00am and 2:00pm, and pictures from the visit can be seen in Appendix K.

The museum was a four-story building. The first floor served as an entry, and housed a room constantly displaying videos that provide the history of the museum and its creator, as well as descriptions of the sword guild (people who train to reenact medieval martial arts). Also on the first floor was a separate orientation auditorium that played at certain times a video specifically made to acquaint visitors with the subject and the museum. There was also a gift shop, a reference library (which one must be trained in order to use) and a brass rubbings room.

It was suggested that visitors take the orientation, and then travel by stairs or elevator to the fourth floor and work down. The fourth floor was a balcony overlooking the third floor's "great hall", and both floors are designed to appear like the inside of a castle or cathedral. There were stained glass windows and stone columns and archways. Along the fourth floor balcony, there were two sections – one side showcased Asian, African, and ancient European arms and armor, while the other showed slightly less ancient European items. All items were in glass cases, and had descriptive plaques nearby. Though the great hall held some replicas and a model of a crusader on horseback not in glass casing, the majority of the items on display there were in similar, "classic" format.

The second floor housed an interactive exhibit, called the "Quest Gallery," which was largely geared towards children. Inaccurate, "fun" costumes were available. Various armor helmets were provided and could be tried on, but were not labeled with time periods or relevance. Figure 4 shows the table of helmets available for visitors to try on.

Figure 4: Quest Gallery Helmets at Higgins Armory

There was also a helmet visor rigged on a stand, so that a person could stand behind and peer through the narrow slits to get an impression of the poor range of vision it allowed for. This too lacked description and context.

Also notable is the audio tour available, which provided additional information for each sub-exhibit. A "wand" (electronic device with headphones) can be rented and used as a personal

guide. It is important to note that while the wands were an extra expense (in addition to the entry fee), many visitors were using them.

2.3.2 Transportation Museum

On Sunday the 23rd of March, two researchers visited the London Transport Museum. This museum showcases the history of London's public transportation vehicles and systems, and includes full-scale reproductions and authentic vehicles. This museum is fairly modern and in some areas very artistic. Some displays throughout the museum have interactive elements, and one area is dedicated to being hands-on and, like the Quest Gallery in Higgins Armory, it is geared towards children.

This child-oriented area features closets containing costumes of transport officials for kids to try on. One display asks you to answer questions by touching objects, similar to the weapons trivia display at Hands-On-History. There was also a display inviting guests to share how they got to the museum, and responses were given by pressing buttons next to images of the different modes of transport. In addition, a puzzle where visitors could build a wooden model of a bus using wooden blocks of various shapes, showed how the shape of the blocks could affect the aerodynamic properties of the model bus.

A common interactive element in many other areas of the museum was also displayed – visitors needed to press a button in order to activate or light up a display. One such display showed a cross section of an underground track, with a steam locomotive, and a street above. When the button was pressed, the train's wheels turned and smoke came out of the smoke stack. The smoke then exited through grates on the street level, showing how the smoke was ventilated when subway trains were pulled by steam locomotives.

2.3.3 Science Museum

The London Science Museum was visited by the team on the 27th of March, 2008 from 11:15am to 12:00pm. We observed three of the Museum's hands-on, interactive-based areas: the new Launchpad exhibit, the basement, and the "Garden Area."

The Launchpad area was made up of several displays of interactivity all teaching different themes:

-Lens Line Up – changing the number of large lenses in the path of a person's view along a 5 meter distance allowed visitors to distort, flip, and magnify the image of a friend sitting at the opposite end of that distance.
-Seeing through walls – a series of mirrors, as in a periscope, allowed visitors to see someone standing on the other side of a wall, as though they were staring straight through it
-Shadow Trap – a flash casts the visitors shadow on the wall, and glow-in-the-dark material lit by the flash allows the wall to hold the shadow.
-Bubble Making – visitors were challenged to make different size bubbles with bubble fluid, as well as to make a bubble you could poke without popping.

The exhibit as a whole only had small write up for each display, but they were not descriptive or informative, usually extremely open ended with no real facts. The exhibit was not self policing – "explainers" were present to help people use and understand the displays. The room was set up specifically for children. However, there were some more informative displays present in a slightly different area of the same exhibit. One taught the advantages and costs of using pulleys and other simple machines by allowing visitors to pull on a rope with one pulley, three pulleys, to lift the same weight. A race-style display allowed more than one person to get involved – visitors pushed down on a pump that pushed foam balls down a chute, and the first to get their ball to the end "won."

The basement of the Science Museum contained many interactive displays. Most of these exhibits involve pushing a button that causes the exhibit to move, speak, or respond in some way. Some exhibits let visitors use knobs and cranks to interact, for example a visitor could be able to turn a crank that was connected to a dynamo which powered various home appliances; another crank pressurized ammonia gas to simulate a refrigerator's cooling coils. Other exhibits had knobs that turned compact disks and distorted television screens by lowering magnets. One exhibit allowed people to play an actual game of Pong, controlling the "paddles" with knobs. Another display quizzed visitors on the purpose on antique appliances. The appliance in question was illuminated, and three answers were given. Visitors were prompted to push a button pertaining to the answer they believed to be correct. If they chose the correct answer an uplifting jingle was played and the next appliance was illuminated.

Though there is a variety of interactive displays in the basement, most include only a very brief description or label. Some do not include a label at all, a visitors are left to intuit the necessary action, although it is usually a simple push of a button.

The final interactive exhibit at the Science Museum studied by the team was an exhibit called the "Garden Area." This exhibit is mainly geared to children of ages 3-6, as stated by a placard at the exhibit's entrance. It resembles a playground, with tunnels and jungle-gym like objects for children to play on. The tunnels are very low, about 1.5 meters tall, and have sensory displays such as sight and sound ducts and different materials to feel. The exhibit also includes a bubble pool where children can blow bubbles.

2.3.3 Tower Bridge Engine Room

The room was made up of four interactive displays:

-One display illustrated the difficulty of lifting the bridge against wind – you could turn a handle attached to a model of the bridge, and air was blown against it as you lifted
-Another allowed you to compare the effects of using a counter weight on lifting the bridge – there were two handles attached to two models of the bridge, one with a counterweight and one without
-Another allowed you to pump up and down and fill an accumulator, and use the accumulated "steam," hydraulic power, to lift a model bridge
-One display allowed you to pump up and fill an accumulator while a friend sat on a chair lifted by a miniature version of the bridge, to lift and lower the friend.

The displays were self-policing, within glass cases – only the handles were outside the boxes to be touched, and there were guards rather than "explainers."

2.4 Demographic Factors that Affect Museum Experiences

In order to utilize visitor feedback for Hands-On-History, the museum must fully understand how certain demographic categories can influence the way individuals experience museums. This section will discuss what is known about the population of visitors to the

museum each year. This section will also discuss how age, gender, and cultural differences could affect a visitor's experience at the Tower of London.

2.4.1 Age

In order for exhibits to be effective, they need to be designed to appeal to all age groups – from children to the elderly. The Tower of London and Royal Armouries states that, "we provide learning opportunities for a wide variety of people, from school and community groups to adult learners" (Tower of London, 2008). In a previous study at the Explora Science Center, Kuh, Simmons, Sorge, and Whittle (1997) concluded that, "teenagers spent significantly more time at exhibits than any other age groups… [which] may suggest something about their willingness to explore or may indicate an increased tolerance for assimilation of learning". In a follow-up of this study, Whittle (1997) found that

> "Children were the most frequent active participants at the exhibits observed….In all age groups after childhood, except for forty-somethings [sic], passive interaction was the preferred mode of interaction with the exhibits. Age appears to be a significant factor in whether a visitor takes an active or passive role at the museum." (p. 11)

A good or bad experience can be determined by whether the visitor is actively interested in the exhibit. A visitor with a passive role, as stated by Whittle, may not be fully experiencing what the museum has to offer.

Because the Tower of London is trying to reach out to a family-based audience, they must understand that "children are [significantly] more likely to actively interact with exhibits than all other age groups… most people visited a museum primarily for the benefit of children, whether it was a family function or a school function" (Whittle, 1997, pg 5). Exhibits must be designed to be attractive to all ages, from children to their parents.

Hilke (1989) recommends that museum professionals and officials consider family behavior and dynamics in the design of exhibits and museums; many museum exhibits are geared toward the family audience. In order to accommodate the variety of age groups and their learning styles (which will be discussed later in this chapter), "many museums have moved away from simply displaying objects to allow visitors to manipulate and explore the objects directly or through the use of technology" (Whittle, 1997). Because the Hands-on-History exhibit is mainly geared towards the family audience, exhibits must be educationally acceptable for children as

well as adults. This means that text size, reading levels, and displayed material should be engaging for all ages in an interactive manner. An effective exhibit will allow the visitor to take something away from their experience (Clark, et. al. 2005). Making sure that the Hands-On-History exhibit responds to a wide variety of learning preferences will improve the overall experience.

2.4.2 Gender

In order to educate both men and women, exhibits should hold appeal to the interests of both groups. The museum must seek to ensure that exhibits are not biased towards a certain gender; the goal of the Royal Armouries' Education Department is not to exclude certain audiences, but to display the history of arms to both males and females. However, Anderson and Randle concluded in their study that there is a learning difference between male and females: "there is differentiation based on a greater interest by girls in extended cooperative learning tasks, aesthetic issues, and investigative inquires that emphasize more broad and inclusive outcomes, and involve less discrete and instrument-based learning skills (1999)." Moreover, according to Whittle's study (1997),

> "Overall, females tended to spend more time interacting with exhibits and were the most active participants at more exhibits than males were. Women and girls will spend almost one-third more time at a particular exhibit then males. Women and girls also participate actively with exhibits at a greater frequency then males". (pg. 12)

In other words, men and women have different responses to museum exhibits. This difference in response to exhibits according to gender is a factor that could significantly affect the Hands-On-History exhibit.

2.4.3 Cultural Differences

In a city as culturally diverse and frequently visited as London, the Tower of London receives guests from all over the world. It is imperative that the Royal Armouries understands its visitors, and that the exhibits and displays are not biased or discriminating in any way. Cultures are distinct in language, behavior, and morals. With so many different ethnicities at the museum, it may be difficult to please each one. According to Ting-Toomey (1998),

> "Effective communication with people of different cultures is especially challenging. Cultures provide people with ways of thinking--ways of seeing, hearing, and interpreting

the world. Thus the same words can mean different things to people from different cultures, even when they talk the "same" language. When the languages are different, and translation has to be used to communicate, the potential for misunderstandings increases". The Tower must be careful in the design of its displays, as some visitors may interpret them in an offending way. It must also account for different languages; visitors may feel discouraged or unwelcome if they do not understand the displays.

Currently, the Tower as a whole site contains various translations in seven major languages: English, Italian, Russian, German, Spanish, Japanese, and French. There are welcome brochures in each of these languages, and a few of the various displays in the facility are translated as well, but none of the Hands-On-History exhibit contains any translations. Due to limitations on space, labels in all of the most popular languages would leave no room for the displays they described.

2.4.4 Special Needs and Handicaps

Some factors that can have a significant effect on museum visits, and specifically visits to the Tower, are physical and mental handicaps. Just as age, gender and language are considered when designing an exhibit, an equal amount of emphasis should be put on creating the exhibit for those with handicaps. This way, exhibits are not made under the assumption that everyone visiting has the same capacity for learning and the same level of interaction.

Handicaps can affect museum visits by modifying visitors' perceptions and impairing their abilities to interact. Some visitors, for example, may not learn from exhibits based on sound because of partial or full deafness, and some may not learn from labels that are not read aloud if they have limited vision. In an interactive exhibit like Hands-On-History, visitors with motor impairments may not be able to respond with enough strength to interact successfully with displays like "Right On Target."

One other restriction that can affect visits to the Tower is limited accessibility. The Tower of London complex is as a whole fairly inaccessible – the combination of cobblestones, narrow winding staircases, and lack of lifts prohibits wheelchair-bound visitors from viewing exhibits in the White Tower. Unlike concerns of perception, however, the Royal Armouries has little control over access to the third floor because the White Tower is a Historic Royal Palace. Those handicapped persons who wish to see Hands-On-History must be assisted up the stairs.

3. Methodology

This chapter presents in detail the methods that were used to investigate and assess the successes and failures of the Hands-On-History exhibit. Three major sources of information were decided to be useful for this task. In order to perform the assessment, feedback regarding visitors' experiences was sought and visitors' foot traffic and interactions were observed and recorded. In order to guide and concentrate the research efforts completed during the data gathering, two objectives were developed. The first objective was to determine the response of visitors to the exhibit. Visitor response was defined to include their interaction with the displays in the exhibit as well as their feedback according to questions about their visits. The second objective was to determine how many of the daily visitors to the Tower complex are viewing the Hands-On-History exhibit, and at what times of day the exhibit experiences the most traffic. The methods of data gathering were designed, tested, and redefined in order to best answer the project's objectives.

3.1 Objective 1: Determine Visitor Response

Recording visitors' responses to the exhibit was a broad goal, as it involved documenting both their interaction with the displays in the exhibit and their feelings and thoughts related to that interaction. Several approaches were initially designed to meet that end, including a paper survey, a poll, observation, and interviews. The practical application of these methods revealed ways in which they could be changed, tailoring them to the specific circumstances found in the exhibit. For example, some elements of the design, such as the poll of visitors' favorite exhibits, were absorbed into the survey. Most of the data gathered was accumulated through brief and frequent survey-interviews, observation of the visitors, and one longer meeting with a specific focus group, and each of these methods is described herein.

3.1.1 Surveying Visitors

The survey that was used to gather the majority of the data was an amalgamation of three initial concepts – a paper survey to determine the exhibit's educational, entertainment, and expectation-meeting values, some interviews, and a poll to determine the most popular of the displays in the exhibit. Though elements of each of these initial plans are evident in the survey,

some aspects were diminished and others emphasized as the qualities most important to analyze became apparent.

The originally planned survey was complicated and lengthy. It was geared largely towards quizzing visitors on specific facts they might have learned from the exhibit and gathering their demographic data. Upon some primary observations of the exhibit and a discussion with the curators of its overall theme and intention, it became apparent that the fact oriented quiz would not relate well to the analysis of its success. The exhibit is not fact oriented, so the quiz was reduced to two simpler questions – "Do you feel you have learned something from this exhibit?" and if so, "Is there something specific?"

Another section of the first survey examined visitors' expectations. Visitors would have been asked to explain their expectations before they entered Hands-On-History, whether the exhibit met those expectations, and why. This seemed at first to be an appropriate way to judge the exhibit's success – if a majority of the responses suggested that the exhibit met visitors' personal expectations, it would support the notion that Hands-On-History was a success. The questions about what their expectations were and why the exhibit did or did not meet them would have also provided useful qualitative information about visitors' perspectives of the exhibit. It was determined later, however, that visitors' expectations could vary widely, and might not be comparable enough to observe a distinct and statistically supported trend. The questions were simplified to ask "Did you know about Hands-On-History before arriving?" and if they had, "Was it what you expected?"

The Royal Armouries had attempted a few times before to gather input by survey regarding the exhibit, once through an open guest-book for comments and another time through a paper survey. The open-ended nature of the comment book and the high rate of visitors moving through the exhibit rendered the results largely inconclusive. The retrieval box was stuffed with trash, and the open-ended comment book encouraged diaries of extroverted visitors' experiences in London rather than specific comments regarding the exhibit. The poll, according to the initial plan, would have been a separate paper with a list of the names and descriptions of the interactive displays in the room, asking visitors to mark their favorite and drop it in a collection box. The information about the relative failure of the previous paper survey discouraged this method. This question about the visitor's favorite display became a question on the survey rather than its own separate poll.

As in the case of the poll, the concept of printing up and distributing a paper survey was discouraged by the history of the preceding survey. A different approach was developed, where the survey's questions were asked aloud as an interview, and the feedback provided by those interviewed would then be recorded by our team on data sheets. This way, the complicated logistics of the paper survey could be avoided, and the interviewers had the added benefit of being able to write down extended responses or comments that would not otherwise be given on the original survey.

The initial observations of the exhibit impressed upon us the wide range of visitors received by the Tower each day. We intended to seek responses from as representative a sample as possible. To do this it was necessary to simplify the survey from our initial plan so that children, special needs students, adults, and older individuals, as well as those whose first language is not English, could be asked. Some of the more qualitative, open-ended questions were removed.

In order to test the survey and practice interviewing, a preliminary survey was devised and printed as shown in Appendix C. The questions were as follows:

1. Age Under 10 11-17 18-25 26-35 36-49 50+
2. Gender Male Female
3. Language "Is English your preferred language?" English Other_____
4. What was your favorite exhibit?
5. Was there an exhibit you didn't like?
6. Do you feel you learned something from this exhibit?
7. Is there something specific?
8. Did you know about Hands-On-History before you entered the room/ was it what you expected?

Treating the survey as we would in the real data-gathering period, we tested it to find any distinct mistakes, unnecessary aspects, and/or missing elements. The response sheet to this survey is shown in Appendix D.

One significant change that was made was to reorder the questions so as not to discourage visitors from responding. Asking visitors for demographic information before

reaching the parts that encourage their feedback did not emphasize the fact that the Royal Armouries (as well as our team) would value their feedback. Language was moved to question 1 because it immediately differentiated whether they could easily understand our questions and how they might have been limited in their responses. Visitors also seemed to appreciate the acknowledgement that English was not their first language, and were encouraged to try to answer despite this barrier. That question was changed to ask if English was their first language, rather than preferred, which avoided ambiguity.

Another change was to uniformly define the difference between "displays" and "exhibits." We decided to treat Hands-On-History as an exhibit and to describe the panels as displays to avoid confusion. Question 7 was changed to ask if they could share an "example of something they learned," because visitors did not respond well to being asked if there was "something specific."

To balance for the loss of the open-ended questions originally planned to be part of the survey, a question asking whether visitors enjoyed the exhibit or not was added, as well as a question regarding whether or not visitors felt they would like to see more interactive displays in the White Tower. This helped link their response to the broader context of the museum the exhibit is part of.

Also shown in Appendix E, the revised survey that was used to gather much of the data follows:

1. Is English your first language?
2. Did you enjoy the exhibit?
3. What was your favorite display?
4. Was there a display you did not like?
5. Do you feel you have learned something?
6. Can you share an example of something you have learned?
7. Did you know there were hands-on displays before you entered this tower?

7a. Was it what you expected?

8. Would you like to see interactive displays in the rest of this tower?
9. What is your age?

One question, 7a, was removed after two days of surveying were completed. After 80 surveys, only five visitors had prior knowledge of the exhibit. Two of them knew of it only because they had visited before, and therefore they did not have special expectations. It was decided that only those who respond "yes" to having any prior knowledge of the exhibit would then be asked "how did you hear about it?" and "was it what you expected?"

A survey and a survey response sheet were formed and printed. The survey sheet was a laminated copy with large font to assist asking the age question and to act as an aid to those whose first language was not English. Certain words on this copy were bolded to emphasize their importance, such as "favorite" in question 3 and "example" and "learned" in question 6. Question 9 had all of the ranges people's ages could fall into listed under it. The survey response sheet was made for recording. We were able to record the responses of three people on each sheet. Those questions with a limited number of answers (gender, yes/no questions) had these answers listed for interviewers to circle, and open-ended questions were given boxes to record responses. The response sheet is shown in Appendix F.

There were some advantages to the surveying method we chose. Surveying visitors at the exit to the exhibit was advantageous; the fresh memory of just having seen it made that an opportune time to gather information about their experience. Asking the questions aloud rather than on paper allowed gestures and other body language to carry some of the information that words alone could not have conveyed. Many of the questions had yes or no answers. The polar nature of these questions facilitated later analysis of the data for trends. With a short list of predetermined responses, a key was made and the data was entered using that key. The data entry spreadsheet and key for the survey questions are included in Appendix A along with the data collected.

The surveying method for gathering visitor feedback was not without limitations. The Hands-On-History exhibit was the last major exhibit visitors saw at the top of the White Tower before heading down to the final hall and the exit. This means that many of the visitors were on their way out, especially those with specific schedules to keep to. There were those that could not speak English well enough to listen, read, and/or respond to the questions, and so they are unrepresented in the data. There were also people with a group that needed to stay together, such as children following parents who already left. Some visitors also did not view enough of the

exhibit to warrant asking them for input. Still others refused to comment, and some of them most likely did so because the interview format was too personal.

Purposive sampling was chosen after the initial test as the method for sample selection because of these factors. The initial plan was to ask every 10th individual to form a systematic random sample, but it was found ineffective for two reasons: many visitors turned us down, and the visitors did not leave in an orderly, linear fashion, but rather in clusters that were hard to predict. In the purposive sampling that was used in place of systematic random sampling, visitors were approached based on demographics.

Lastly, the survey did not focus on people's responses to each individual display. The survey would have been too long for the quick pace we intended to set if it had contained discussions of each individual exhibit. This was balanced by observation, as described in the next section.

3.1.2 Observing Visitors

In order to determine visitor response to Hands-On-History, we used a quantitative method of gathering data. Observation was used in determining which parts of the exhibit are most commonly viewed, which are viewed for the longest periods of time, and the level of interaction experienced at each display. In small-scale research, observation is useful because it takes only a small amount of observation to form data that can show patterns that even participants themselves are unaware of (Knight 2002). To select groups or individuals to observe, we used purposive sampling. Similar to the previous surveying method, we selected people based on their different demographics.

In order to efficiently record visitors' actions and time spent during observation, the team created a checklist for data input. As a chosen visitor passed by each display, a team member recorded the duration of the visit at the display and checked off the visitor's actions on the spreadsheet as shown in Appendix G. These actions were interacting with the exhibit, reading the label, commenting on it, watching others interact, or ignoring it. In addition, we would also record the visitor's gender, estimate their age range, and also check off their group category, which were a single person, a couple, parents, and children. It was also important to make sure the visitor did not know they were being observed, as this could alter the data. After a day of trial observations, two changes were made to the checklist. The observing team members

noticed that it was necessary to add “person with friends” to the group types, as well as an action for when the visitor only observed the exhibit. We also concluded that the “Firepower” display should also be added because although it is not hands-on, a large amount of people stop to watch the video. The revised observation sheet can be seen in Appendix H. The first trial was done cooperatively with the two observers, with one recording the actions and the other keeping track of time. We found that this task could be done by one person, thus both team members observed and kept time individually. The cooperative effort allowed both members to develop a consistent method for observation. After 300 observations were gathered, the team proceeded into the data entry stage of this method.

For the easy access and analysis of our results, we created a spreadsheet to input all the data, which is included in Appendix B. We created a legend to assign each action and group type a character to condense data on the spreadsheet. After analyzing the results in groups of overall population, gender, age, and group makeup, we developed bar graphs comparing these demographics to:

1. Average time spent at each display
2. Display manipulated most
3. Display that visitors read label of most
4. Display visitors attended most
5. Display visitors ignored most

These graphs will help us to visualize trends and patterns in our results, allowing us to make conclusions and recommendations.

3.1.3 Observation of Individual Displays

The observation of individual visitors as they moved through the exhibit and interacted was one source of useful data. In order to learn more about each display in the exhibit, we decided to observe them individually. The idea was to observe and record the comments visitors made, any areas of confusion, and the patterns of their interaction. From the observation we were able to identify flaws in the displays and consider possible ways of fixing them. The affect of the size and make-up of the crowd at a display on an individual’s experience was also observed.

There were nine interactive displays in the Hands-On-History exhibit and each was individually observed for a period of time throughout different times of the day. Each display was observed in both the morning, when there are few people on the floor, and in the afternoon, when there is a significantly larger amount of people. Three of the displays were observed from 10:00am to 10:30am, three more from 10:30am to 11:00am, and the last three from 11:00am to 11:30am. All nine exhibits were also observed later in the day when more people were entering the exhibit, to make additional observations. Three of the exhibits were observed from 3:00pm to 3:30pm, three were observed from 3:30pm to 4:00pm and the last three were observed from 4:00pm to 4:30pm. The observations recorded are provided in Appendix N.

3.1.4 Interviewing Special Needs Students

To determine how handicaps can affect a person's experience at a museum, we interviewed a group of special-needs students who had interacted with the Hands-On-History exhibit. Given only a short amount of time with them we asked a few specific questions to see how they felt about the exhibit. The questions were both quantitative and qualitative to collect the greatest amount of information. We hoped that the interview would be able to identify trends within the group and collect open responses that could aid us in the development of recommendations to the design and presentation of the exhibit.

To gain feedback on the Hands-On-History exhibit, we asked the special-needs students an open-ended question of what they had thought of the exhibit. We discovered that starting with an open-ended question was not the best approach in this situation. Because the group was very shy and did not really know who we were or what we were doing, we decided to take a different approach to get them involved—we asked them to raise their hand if they enjoyed the exhibit. The success of participation sparked us to ask each of them which display was their favorite. Asking the students what they enjoyed and did not enjoy helped us to identify if their handicaps limited them or encouraged them to enjoy certain displays.

Once the students had assessed the exhibit based on their likes and dislikes they gave us some input on whether or not they felt they had learned something. Asking them what they had learned was an open question addressed to the group as whole, so that those who felt comfortable could express themselves. Accessibility was last topic discussed before they explained to us a project that they were undergoing that has been drawing them to the Tower for a couple hours

once-a-month. The feedback we received was then analyzed qualitatively to determine the impacts of handicaps on people's experience with Hands-On-History.

3.2 Objective 2: Determine Flow Rate

In order to gain a further understanding of the popularity of the Hands-On-History exhibit, we gathered information about the flow rates of people at several locations in the White Tower. Rates were tallied for three different days, of the entire day for complete and accurate data.

We gathered and compared flow rates into the Hands-On-History exhibit and into the entire White Tower to determine what percentage of those entering the White Tower visited the Hands-On-History exhibit. We also counted the number of people who entered the Hands-On-History exhibit room, but did not interact or observe any of the exhibits. In addition we also obtained the number of people entering the entire Tower of London complex from the Yeoman Guard. We used this to determine the percentage of total visitors to Tower of London that participated in the Hands-On-History exhibit, as well as the percentage of visitors that visited the White Tower. The flow rate of people entering, but not taking part in the Hands-On-History exhibit, allowed us to calculate an accurate percentage of people who actually participate in Hands-On-History after entering the White Tower.

Flow rates were recorded at three locations throughout the White Tower, and a rotation schedule was devised. The rotation was set up so that group members had one and a half hour recording shifts with half hour breaks between each shift as shown in Appendix O. The shifts were staggered so that each location had a group member recording flow rates throughout the day.

Flow rate numbers were tallied on Palm Pilot PDAs, using the calculator application. Rates were recorded at ten-minute intervals for ease of counting as shown in Appendix I, and to allow for smaller error margin should a mistake have happened. Counting began with the opening of the Tower of London at 9:00am until close at 6:00pm and the results can be seen in Appendix J.

4. Results and Analysis

Data was collected regarding visitor response and visitor flow rates using the methods previously described, and this chapter presents pertinent analysis of these results. The goal of the analysis was to aid in the assessment of the effectiveness of the Hands-On-History exhibit. To that end, the findings have been organized into three measures of effectiveness. The first measure was the attendance of the exhibit, the second was its educational value, and the third was the enjoyment of the exhibit by its visitors. The analysis presented reveals how the exhibit has performed against each of these standards.

4.1 Visitor Attendance

More than half of all visitors to the Tower of London attend Hands-On-History during the course of their visit. The flow of visitors into the White Tower and up to the exhibit is not constant over the course of the day, and visitors attend certain displays more than others; the patterns in attendance of the individual displays and of the exhibit overall reveal how it is effective.

4.1.1 Attendance of the Exhibit as a Whole

In order to evaluate Hands-On-History, the exhibit was first treated as an entity within the broader contexts of the White Tower and the entire Tower site. The data collected reveals the number of visitors that arrived at the exhibit, and how many of those visitors stayed to attend it rather than simply walking by. The variation in the number of people entering the White Tower and the exhibit over the course of a day was analyzed for trends. The reasons for immediately exiting the exhibit were discussed as well. Each of the findings revealed different aspects of the effectiveness of the exhibit.

The Tower of London is unique among museums in that its visitors are not only there to enter one collection-dedicated building and view the exhibits within. Visitors are free to choose whether they should enter the White Tower at all, which is where the main body of the Tower collection is displayed. Despite these factors acting against attendance of the Hands-On-History exhibit within the White Tower, it still performs well against the common museum evaluation

standard that more than half of museum visitors should attend it. This is shown by the data collected in this assessment.

The numbers of visitors that were recorded entering the White Tower, entering the Hands-On-History exhibit, and immediately exiting the exhibit upon entry were averaged among three days of counting data. This counting data is presented in full in Appendix J. Overall, on an average day, 6906 entered the Tower site, 5099 entered the White tower, 4380 entered the Hands-On-History exhibit, and 467 of those immediately exited the exhibit.

The percentages in Table 1 represent ratios of visitors entering and exiting various points in the Tower site. The value of the labels listed in the columns were divided by the row value to form the percentage– for example, the bottom, leftmost cell represents the percent of Tower visitors that entered the White Tower.

Table 1: Percents Relating Visitor Flow through Various Points in the Tower

	Entered White Tower	Entered Hands-On-History	Viewed one or more display
Entered Hands-On-History			89.3%
Entered White Tower		85.9%	76.7%
Entered Tower of London	73.8%	63.4%	56.7%

The table states that 73.8% of visitors entering the Tower of London enter the White Tower. In addition, 63.4% of visitors entering the Tower of London entered Hands-On-History and 56.7% viewed one or more display. Note that the column pertaining to those who viewed one or more display within the exhibit reveals how many visitors attended the exhibit. This value was not directly measured – we counted the number of visitors that immediately exited and averaged them for the three days, and this value was subtracted from the average daily number of visitors entering the exhibit to obtain the number of visitors attending the exhibit, 3913. This value was then used to obtain the three percentages shown.

One significant measure of the success of Hands-On-History was the ratio of those that attended the exhibit to the total number of visitors to the Tower. We found that on an average day, 56.7% of visitors to the Tower site attended Hands-On-History. The fact that more than half of all Tower visitors attended the exhibit is a good indication of its importance. In addition, about

75% of visitors to the White Tower attended the exhibit, indicating that in the context of the White Tower the exhibit is part of three of every four visitors' experiences.

In addition to revealing success in terms of these overall daily percentages, the effect of the time of day on the flow rates of visitors within the Tower of London was assessed. The average numbers of visitors entering the White Tower, entering the exhibit, and immediately exiting the exhibit during 30-minute periods were charted, as shown in Figure 5.

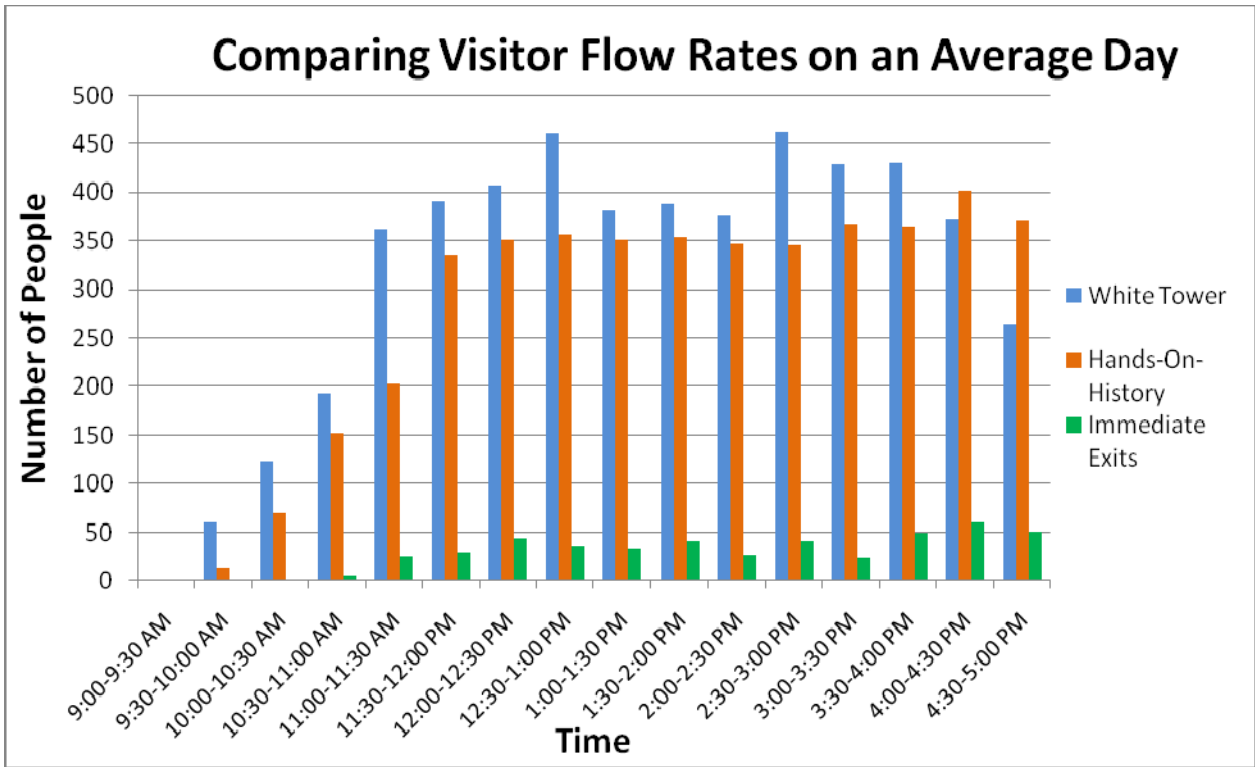

Figure 5: Comparing Visitor Flow Rates on an Average Day

It takes time for the visitors entering the White Tower to get to the Hands-On-History exhibit, so the people entering the White Tower during any one of these periods were not the people entering the exhibit during that same period. Furthermore, not all visitors who entered the White Tower climbed to the third floor and entered the exhibit. Those who exited the exhibit immediately, shown in yellow, *were* included in the number of people entering the exhibit during each period (shown in light blue).

As suggested by George Hein, a Senior Research Associate of the Program Evaluation and Research Group of Lesley University, "…the valid statistical manipulations from [flow rate]

data are limited because, as most researchers recognize, the distribution of visitors over time is not symmetrical; it does not follow a normal distribution." Therefore, it was more informative to investigate how and why the White Tower, exhibit, and/or immediate exit flow rate data changed throughout an average day, rather than averaging the flow rates.

In the case of the White Tower, the number of visitors entering steadily rose until about 12:30pm. In the afternoon, between 1:00pm and 2:30pm, there was a decrease in visitors entering the Tower. Around 2:45pm, the number of visitors entering the Tower peaked again, and from there until closing it steadily declined. This trend is shown in Figure 6.

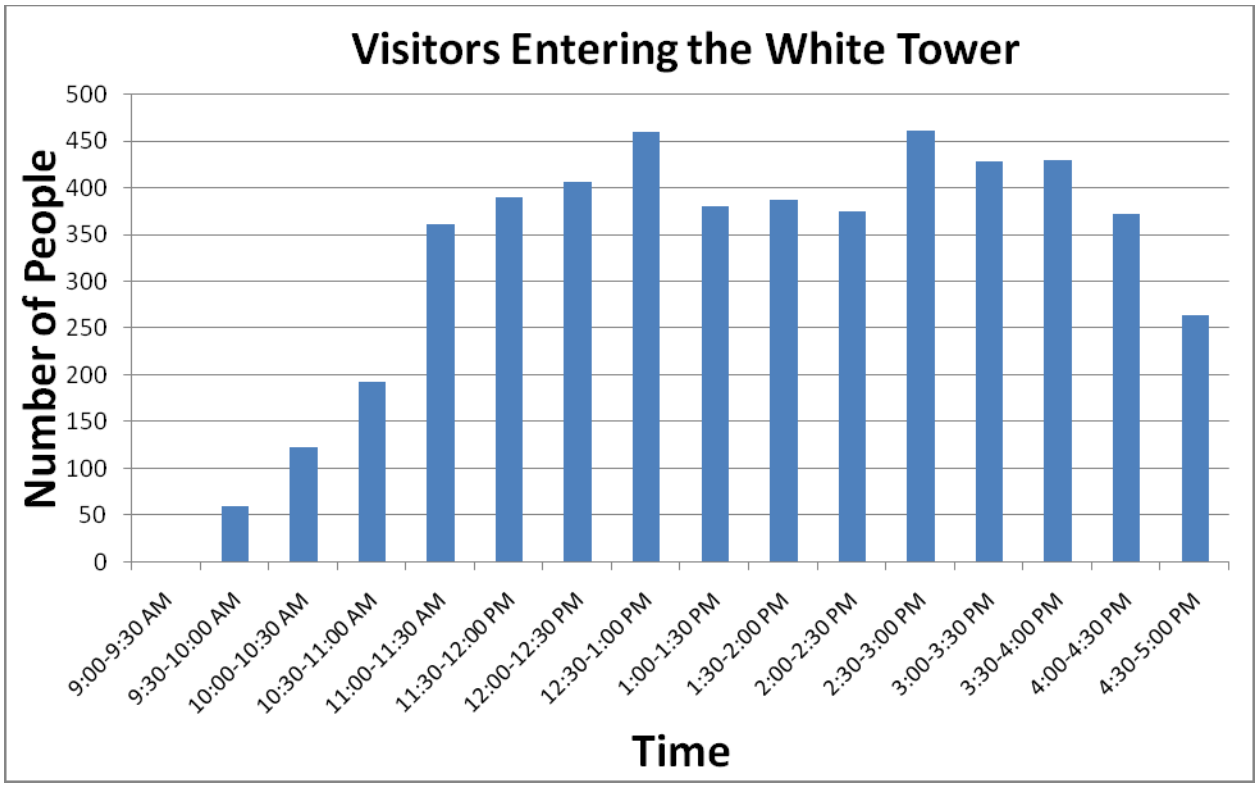

Figure 6: Visitors Entering the White Tower

Visitors did not first begin entering the White Tower until after 9:30am though the site opens at 9:00am on most days. The White Tower is not next to either entrance to the site, and the need to travel the distance from either entrance to it was one reason for this. There are other areas that can be visited within the site, most notably the Crown Jewels, and by visiting these areas visitors may also have been delayed in coming to the White Tower. The inside of the White

Tower is not part of the hourly site tours, and some visitors also chose not to visit the White Tower at all. Still others could not enter it because it is not accessible to those with limited mobility such as wheelchair users.

Similarly, the flow of visitors into the exhibit was slow at first and increased over the course of the average day; Figure 7 singles out this data from Figure 5.

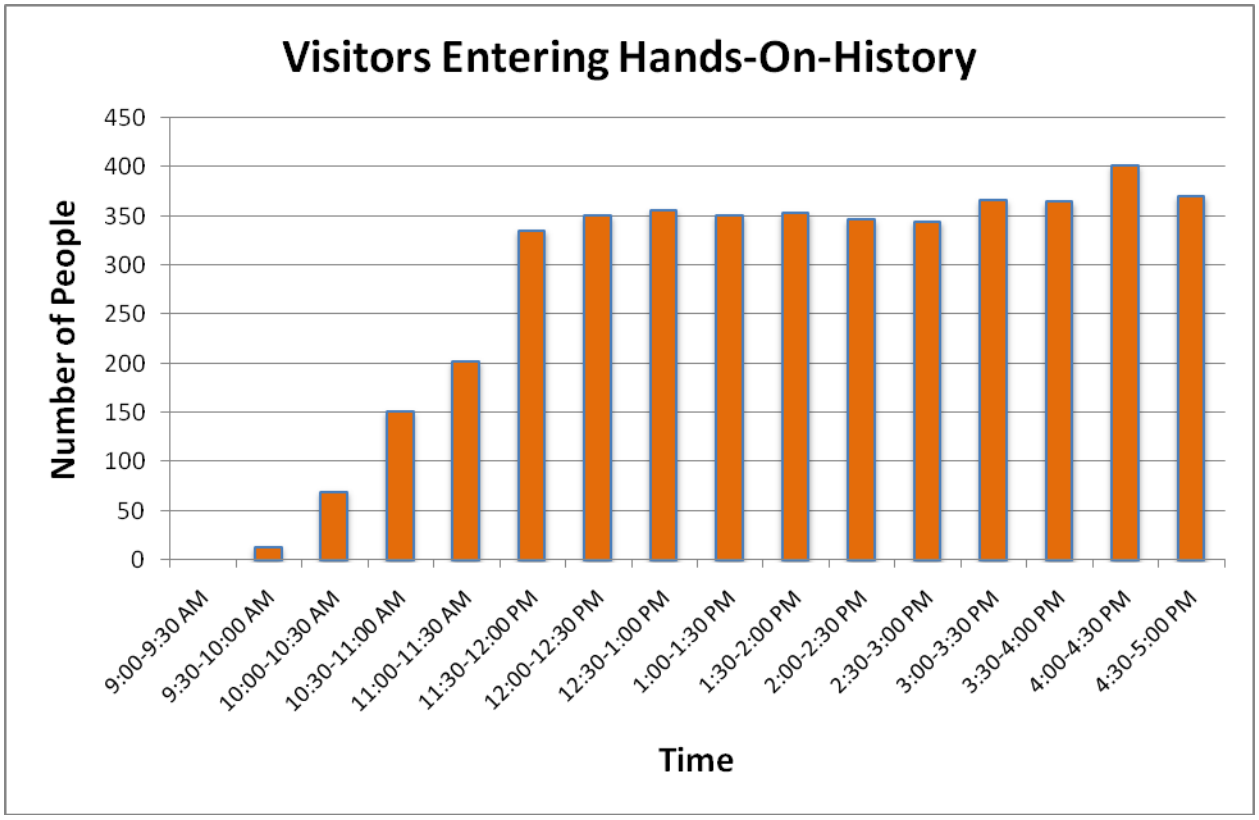

Figure 7: Visitors Entering Hands-On-History

One significant difference between the White Tower and exhibit flow rates is that the exhibit's flow rates after 12:30pm were fairly consistent until the end of the day peak at 4:00pm, whereas White Tower values peaked around 12:30pm and 2:00pm. Not everyone entering the White Tower climbed to the exhibit – in fact, 14.1% did not travel further than the first floor, and most of them entered during those peaks around 12:30pm and 2:00pm. Visitors are warned that the staircases are long and narrow, and they most-likely chose not to climb the stairs due to lack of accessibility, fatigue, or because people were on a tight schedule with other stops in mind. The

surveys revealed that visitors typically did not know the exhibit was there, and this means their decision not to climb was *not* based on their desire to see or to avoid it.

If the number of visitors entering the exhibit over the course of the day was the only value used to assess exhibit attendance, the number of Tower visitors attending the exhibit would have been over-represented; the number of Tower visitors who actually attended the exhibit was determined by counting how many visitors entered and immediately left the exhibit and subtracting that from the number of visitors entering the exhibit.

The immediate exit figures for the average day are shown in 30-minute increments in Figure 8 alone (as previously shown in Figure 5).

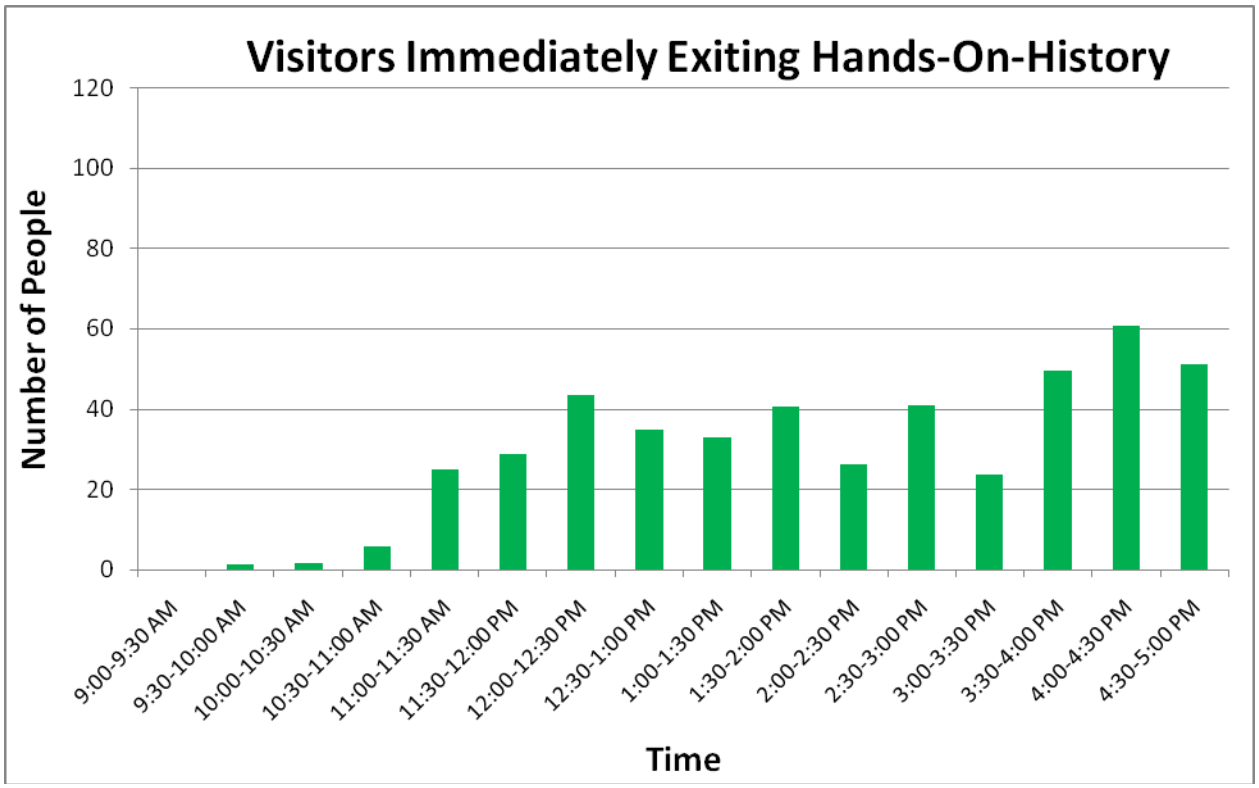

Figure 8: Visitors Immediately Exiting

The top floor of the White Tower is the last stop of many Tower visitors and is the location of the exhibit; some of the immediate exits were impacted by this. When asked during the survey what visitors did not like about the exhibit, many visitors indicated that they would have liked to have known about the exhibit before they arrived. Some indicated that this prior knowledge

would have allowed them to set more time aside for it, especially to give their children a chance to interact more. One such visitor said that she "was on the verge of leaving, and did not like that the exhibit was at the end." Other reasons cited by visitors for their quick exits included catching up with members of their party, keeping an itinerary that did not include the exhibit, and avoiding the crowdedness that often built up there. When surveying visitors, several of them explained that what they disliked most about the exhibit was its crowdedness.

About 10.7% of those who entered the Hands-On-History exhibit immediately exited during the average day, and the variation of this percentage over time for the average day is shown in Table 2.

Table 2: Percent of Visitors Entering the Exhibit that Immediately Left During 30 Minute Intervals

9:00am – 9:30am	-
9:30am – 10:00am	7.7%
10:00am – 10:30am	2.9%
10:30am – 11:00am	3.9%
11:00am – 11:30am	12.4%
11:30am – 12:00pm	8.6%
12:00pm – 12:30pm	12.6%
12:30pm – 1:00pm	9.8%
1:00pm – 1:30pm	9.4%
1:30pm – 2:00pm	11.6%
2:00pm – 2:30pm	7.5%
2:30pm – 3:00pm	11.9%
3:00pm – 3:30pm	6.5%
3:30pm – 4:00pm	13.7%
4:00pm – 4:30pm	15.2%
4:30pm – 5:00pm	13.7%

The upper limit of the percent of visitors entering and immediately exiting was 15.2%, and this occurred during the time when the most visitors were entering the exhibit. The average was about 10.0% that immediately exited, so when the exhibit was at its busiest, 50% more than the average immediately exited. The number entering the exhibit can be correlated with the crowdedness, so when the exhibit was most crowded, the most people left as soon as they entered. Additionally, in the morning hours, when the fewest visitors were entering the exhibit,

the fewest percent of those visitors immediately exited. In other words, crowding had a definite negative influence on attendance.

4.1.2 Attendance within the Exhibit

A benchmark of the effectiveness of the individual displays was attendance by visitors. Both attendance and the factors affecting it were investigated. The analysis of the overall percent of those who attended the exhibit and each of the displays revealed how well visitors were exposed to the exhibit before leaving.

Similar to the definition of attending the exhibit, viewing a display was taken to mean doing more with that display than simply walking by it, such as reading, manipulating, or watching others manipulate it. The displays named from left to right in Figure 9 are in the order they are arranged in the room, and the bar chart appears to reveal a trend in attendance.

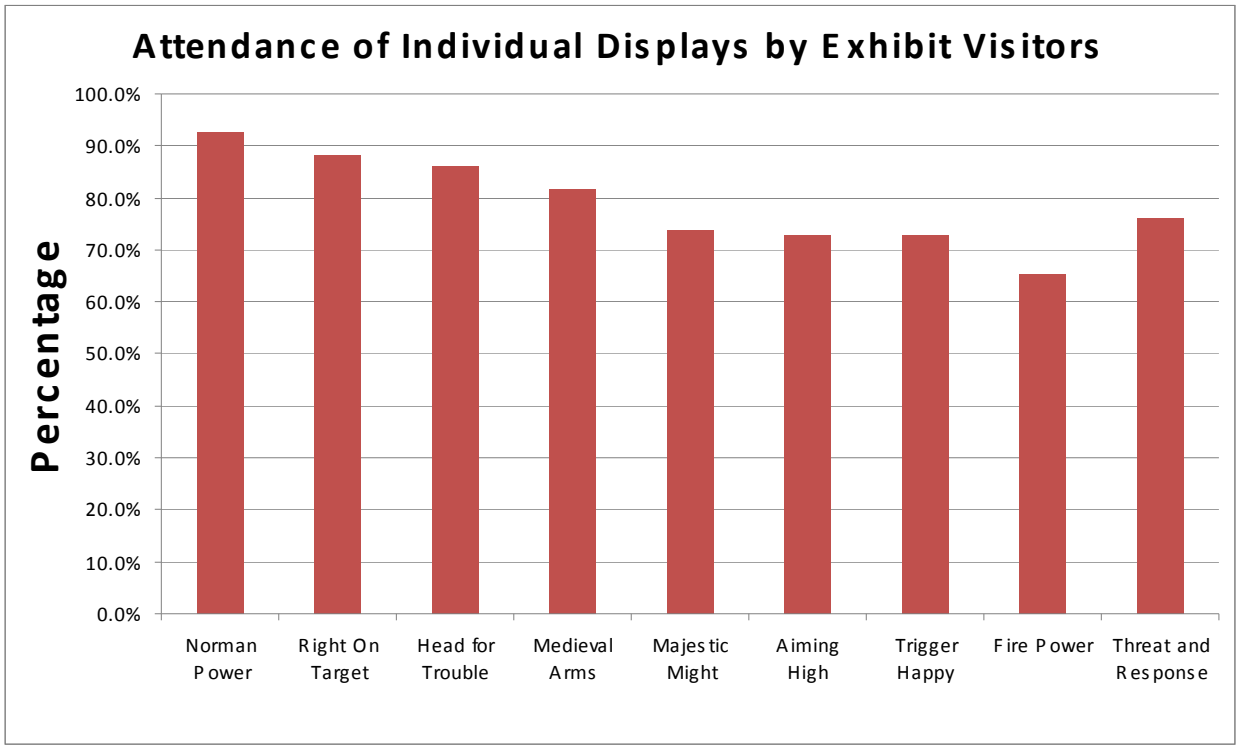

Figure 9: Attendance of Individual Displays by Exhibit Visitors

"Norman Power" engaged the most visitors to Hands-On-History, 92.7%, but this may be due to the fact that it is the first display in the sequence. The apparent trend is that attention

decreased steadily as visitors moved through the exhibit; this is, however, not the case. Summarizing the data in this fashion erases two critical aspects of visitor attendance of the individual displays that point to the exhibit's effectiveness: that visitors had the opportunity to choose which displays to attend (and to some extent what order to visit them in), and that a significant number attended more than half of the displays.

A perspective on the attendance of the exhibit was given by the observation data, provided in Appendix B. Visitors that attended at least one display were observed so this data does not represent those that did not attend any displays. In *Learning from Museums: Visitor Experiences and the Making of Meaning*, John Falk and Lynn Dierking make recommendations to maximize the effectiveness of an exhibit at conveying its material; they claim that curators of successful exhibits "develop museum learning experiences that provide choices and put the learners squarely in control of their own learning (2000)." The data supports what is already apparent from a simple observation of the room; visitors to Hands-On-History, while guided by the timeline in a general order, could (and did) choose which displays to investigate, and in what order. This means that the exhibit meets one of Falk and Dierking's criteria for success.

During our observation of Hands-On-History, visitors typically attended "Norman Power" first. This gave them the impression of the interactive nature of the displays that distinguish the exhibit from others in the White Tower. After this initial interaction, visitors were more selective about which displays to attend, though 76.3% also attended the "last" display, "Threat and Response." An explanation for this trend is that visitors felt obligated to attend "Norman Power" first and "Threat and Response" last, but that they still felt free enough to choose among the seven in between. This means that "Fire Power" did not receive the least attention because it is the second-to-last display in sequence, but rather because it has the least "attracting power." Attracting power is one measure of success that is common to museum evaluations. "Attracting power refers to the number of visitors who approach a particular exhibit or display," and the display that attracted the fewest visitors is an indication that it is most in need of improvement (Donald 1991).

Another common way to measure effectiveness, proposed by Beverly Serrell, is to measure whether more than half of those that attend the exhibit visit more than half of its displays (Hein 1998). According to the observation results, 88.1% of visitors attending Hands-On-History attended more than half of its displays. In terms of the average day, this means 3440

visitors were exposed to more than half of the material in the exhibit, which is a success. Furthermore, 33.6% of attending visitors attended all nine displays, which is an encouraging statistic. This means that one third of all visitors that attend the exhibit have been exposed to almost all of the material within it in some way.

4.2 Visitor Learning

Observation and survey results were used to determine the educational value of Hands-On-History. We determined the number of people who felt they had learned something as well as the number of people who were able to identify something specific they had learned. Specific demographics and displays were also analyzed to discover their impacts on learning.

4.2.1 Exhibit as a Whole

For an exhibit to be effective, it should not only be enjoyable, but also educational; as shown in Table 3, 87.3% of the people who viewed the exhibit Hands-On-History felt they had learned something. This is an astonishing number since it must be kept in mind that some of the visitors surveyed were too young to comprehend all the material presented. Also, the Tower attracts visitors that have studied British history their entire life and have little left to learn about the Tower or its history. Considering these factors, it is still able to teach six out of seven visitors something.

With regards to learning at the Hands-On-History exhibit, demographics played a small, but noticeable role. The demographics were broken down into three categories: gender, age, and language preference. The data we gathered and analyzed does not conclude that either youths or adults learned more than the other. Table 3 shows results from the survey, with the age column showing a consistent number of people feeling they had learned something throughout the various age groups.

Table 3: Percentage of people who felt they learned

Demographic Breakdown		Percentage of People who felt they learned
Overall:		87.3%
Gender:	Male	86.9%
	Female	87.6%
Age:	10 and Under	88.0%
	11-17	88.2%
	18-25	88.1%
	26-35	86.8%
	36-49	86.4%
	50+	86.6%
First Language:	English	86.6%
	Non-Enlish	89.7%

Observation results also did not provide enough conclusive data as to whether a specific age group learned more. Adults were shown to consistently read more labels than youths as shown in Appendix U, but youths were recorded spending a longer amount of time at the exhibit shown in Figure 13. These results may not show that one age group learned more than another, but they do provide ample evidence that Hands-On-History is effective at educating visitors of all ages.

Through surveying it was found that 89.7% of people who said English was not their first language felt they learned something, compared with 86.6% of those who spoke English as a first language. Language had the largest variation of all the demographics in Table 3, however the variation was not large enough to make the conclusion that those speaking English as their first language learn less. Observation results could not be used to either support or contradict our survey results because the preferred language of visitors being observed could not be assumed.

To determine how learning varied from males to females, we analyzed the results gathered from the surveys and observation. As seen in Table 3 there was little difference in the number of males and females that felt they had learned something. Our observation results revealed more about whether males or females were learning more.

Observation results presented the amount of time spent at each display and which displays each of visitors read the label of. Figure 10 compares the average time males and females spend at each display, and Figure 11 shows how often males and females read labels at each display.

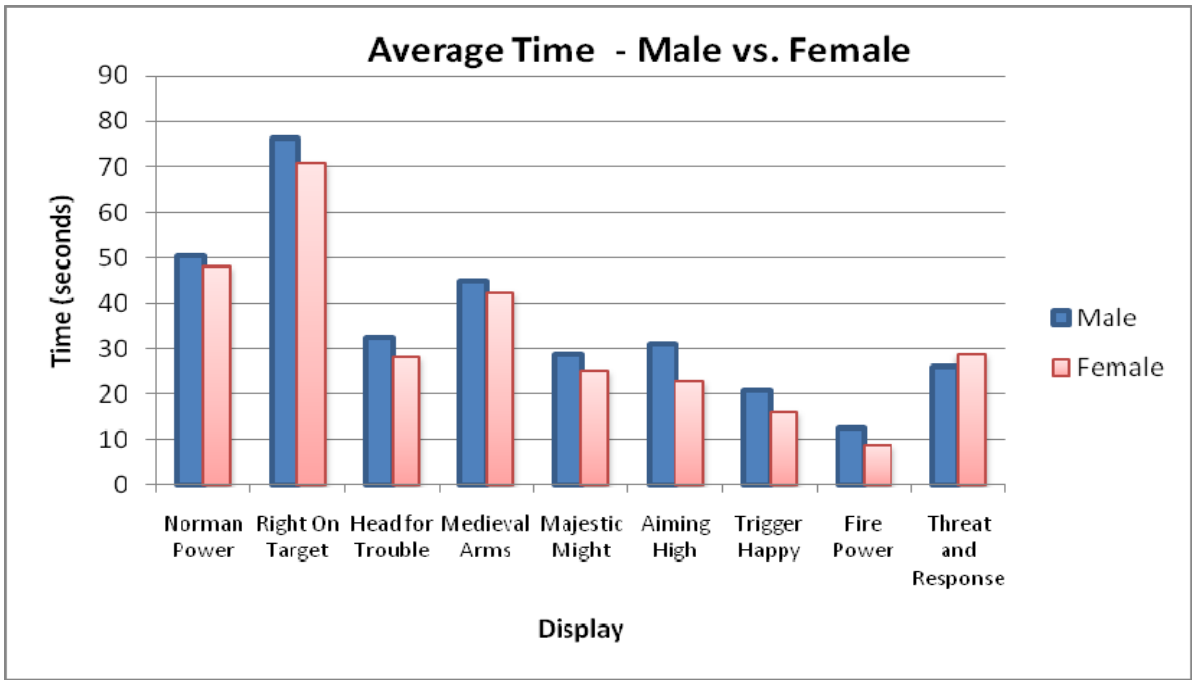

Figure 10: Average Time (male vs. female)

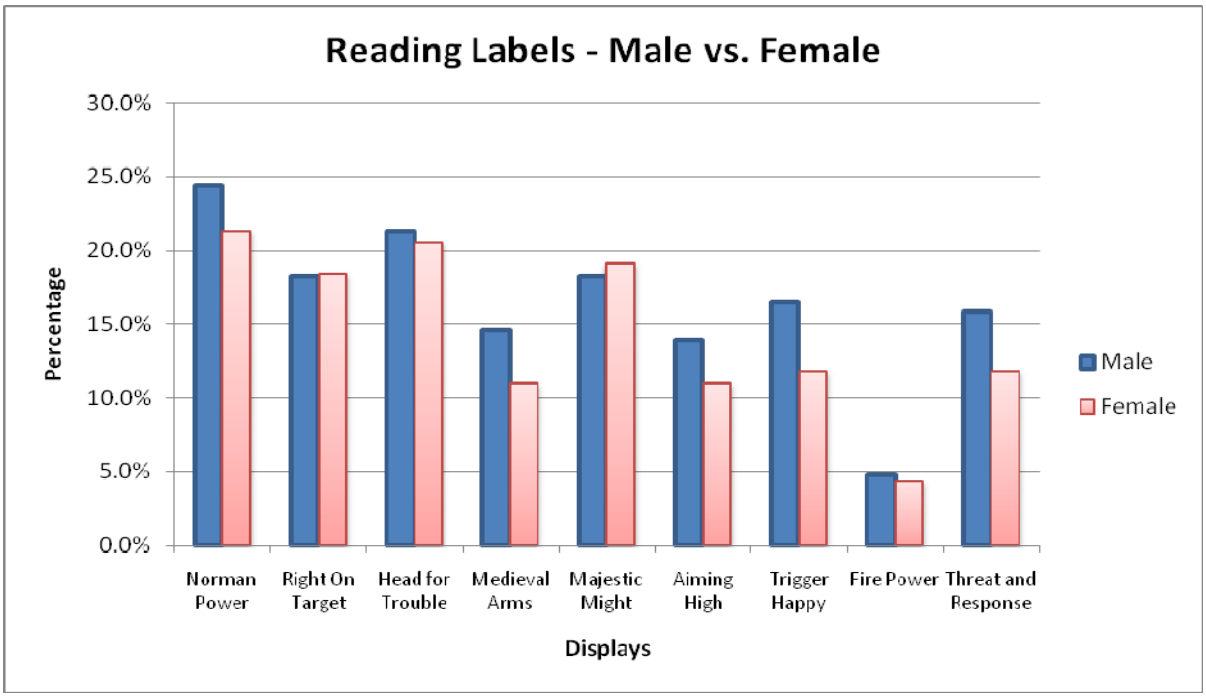

Figure 11: Reading labels (male vs. female)

It is evident from these graphs that in terms of the overall exhibit, men read more labels and spent a longer time at Hands-On-History. We have concluded that men have learned more

from their experience at the exhibit as a result. On the measurement of exhibit effectiveness, Janet Donald commented within *The Measurement of Learning in the Museum* that,

> "The measures most frequently mentioned are associated with visitors' movements in the museum and are discussed in terms of the success of exhibits, specifically their attracting power and holding power… Holding power refers to the amount of time visitors spend examining an exhibit (Donald 1991)."

This quote supports the position that the length of time spent at a display is directly correlated with learning.

4.2.2 Individual Displays

In order to get a better understanding of what visitors learned and which displays had the greatest influence, we asked visitors if they could think of an example of something they had learned. About half of the answers we received were broad and can be attributed to more than one display, such as: "about weapons" or "about history." Other answers we received were much more specific and could be attributed to one or two specific displays. As shown in Figure 12, when asked if visitors could give an example of something they had learned, the most common response was the weight of weapons, a reply given by about 30% of visitors.

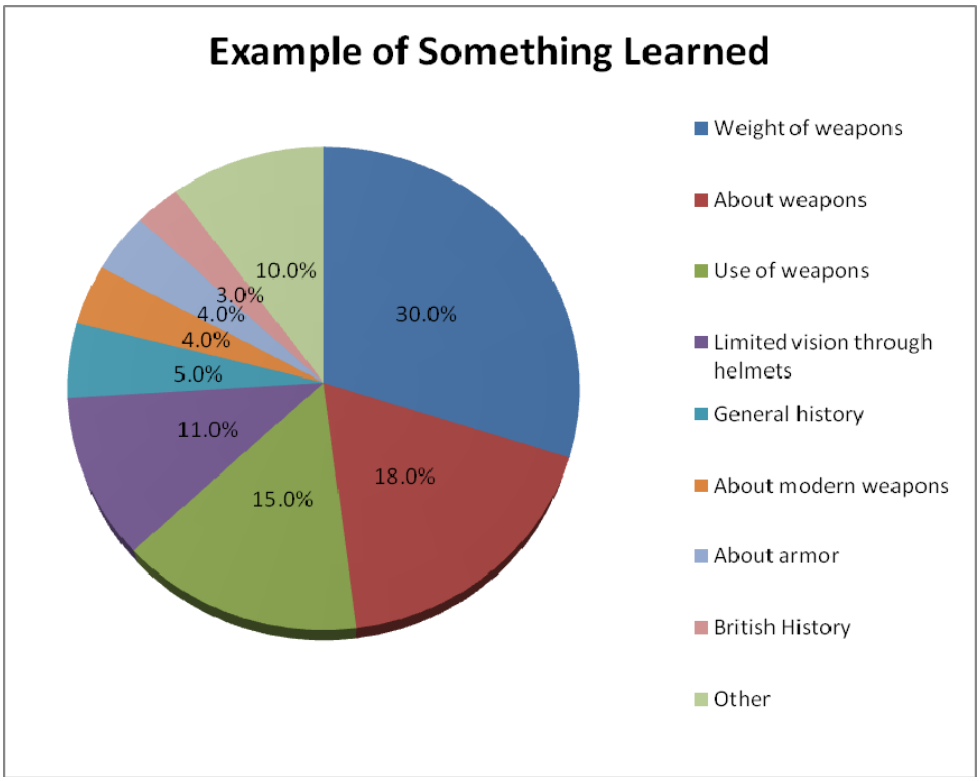

Figure 12: Responses of Learning

The displays that had the largest impact on this concept were "Trigger Happy" and "Norman Power." "Trigger Happy" is a simple display where visitors can lift a musket from the 17th century to determine its weight. Learning the weight of weapons may also be attributed to the display "Norman Power," where visitors lift weapons to answer trivia questions.

Two other common replies that were similar were "about weapons" and the "use of weapons." Although these responses could have been learned from any of the displays in the exhibit, a majority of the visitors pointed to or specifically mentioned "Norman Power," "Majestic Might," or "Threat and Response." These displays were specifically designed to teach viewers about the different uses and functions of weapons throughout history.

The last subject that visitors frequently identified that they had learned was the poor visibility that knights experienced when wearing a helmet. This was learned from the display "Heading for Trouble," a display that allows the visitor to view what would be seen through a visor. Of the visitors we surveyed, about 11% claimed to have learned about the limit in visibility.

Data showed that there was no difference in which displays contributed to learning from males and females or different age groups. According to Figure 10, both men and women spent the most time at these three displays: "Norman Power," "Right on Target," and "Medieval Arms." Figure 11 also shows that males and females read labels most frequently at the same three displays: "Norman Power," "Majestic Might," and "Head for Trouble." Age also had little impact on which displays visitors learned from. From our surveys we discovered that all ages gave similar responses to what they had learned from the exhibit, such as "use of weapons," "poor visibility," and "weight of weapons."

In order to see a broader view of whether a youth or adult spent more time at the exhibit, we created a graph comparing their average times. Figure 13 graphs the average time spent at each display with respect to a youth and an adult, where a youth is less than 20 years old and an adult is 21 or older.

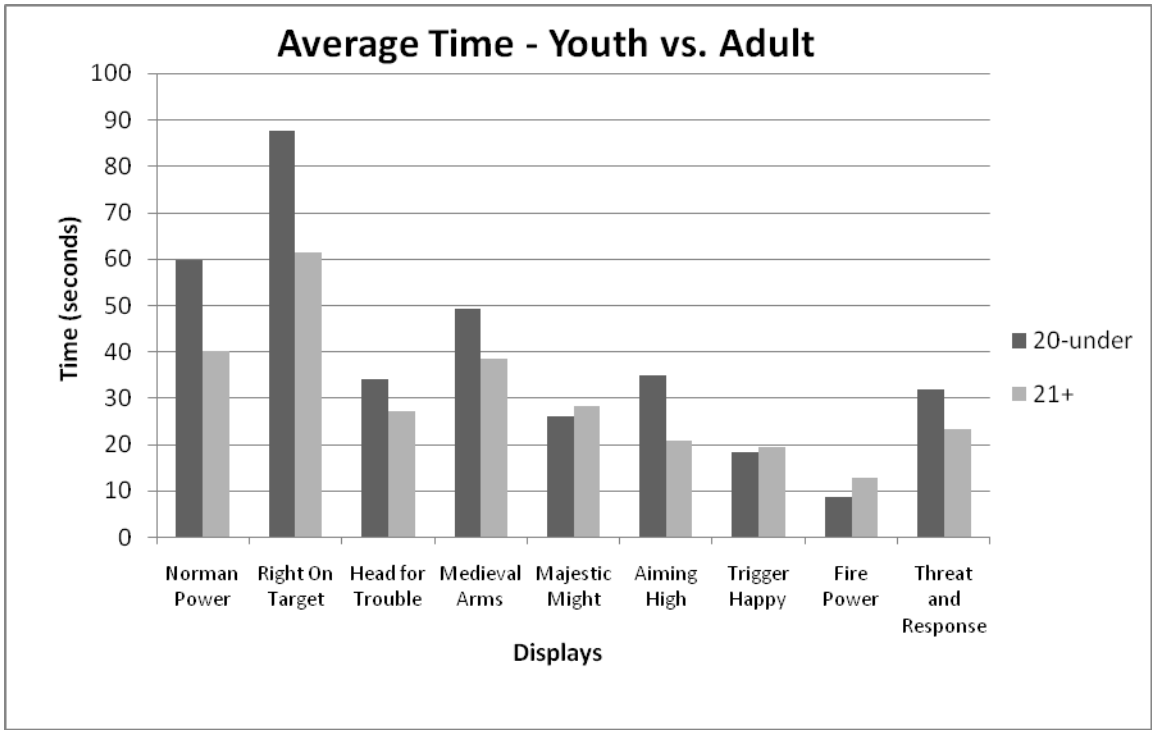

Figure 13: Average time spent (Youth vs. Adult)

Figure 13 shows that both youths and adults spent most time at "Norman Power," "Right on Target," and "Medieval Arms." These results show that the display itself had a larger impact on learning rather than a visitors' age or gender.

Although a majority of visitors whose first language was not English felt they had learned something, there were three displays that may have inhibited learning for non-English speaker: "Threat and Response," "Majestic Might," and "Norman Power." Given that the first two displays are audial, those who do not speak English fluently are not able to understand what is being said. One female, aged 11-17 whose first language was not English stated, when being surveyed, that she "disliked all the talking displays because they only speak English." However, there are many people with so many different languages entering the Tower that providing a translation for each display would be unrealistic. "Norman Power" may have inhibited learning a different way, in that anyone who cannot read English would struggle with its purpose. Although the intention of the display is to quiz the visitor about the use of the weapon, a visitor could pick up the weapons and feel how much they weighed. Because the quiz questions are in English, non-English speakers may fail to see the purpose of "Norman Power." An overall assessment of each individual display in terms of its effectiveness in educating visitors can be seen in Table 8 of the Summary section.

4.3 Visitor Enjoyment

To determine visitor enjoyment we analyzed the results from our observations and surveys. We determined the number of people who enjoyed the exhibit and which displays they enjoyed most. A comparison of the effects of the demographics of age, gender and language was also conducted.

4.3.1 Exhibit as a whole

After the careful analysis of our results, we discovered patterns and trends that revealed the effectiveness of Hands-On-History in terms of visitors' enjoyment. With an overall enjoyment rate of 98.0%, Hands-On-History was determined to be effective. Visitors made several comments throughout the surveys we conducted stating how they liked the idea of a hands-on exhibit.

The survey results showed no difference in overall enjoyment between males and females, with 98.0% of both genders saying they enjoyed the exhibit, as shown in Appendix P. This high level of enjoyment may be a result of response bias, which is a situation where visitors feel

inclined to please the surveyor with their answer. In order to further investigate the effects of gender we used the results from our observations.

Throughout the many weeks of working in the exhibit, we observed a significant difference between school boys and school girls. As classrooms entered the exhibit, it was common for a majority of the boys to enter and immediately split amongst themselves and hurry to a display to interact with. However, many of the girls within the classroom would enter the exhibit and continue with their conversation as a group, ignoring the exhibit entirely. One mother of both a boy and girls said, "The room is really only a boy's room."

The difference between males and females over the age of 20 was less obvious and less significant, with the largest difference being the average time spent at the exhibit. Men over the age of 20 spent an average time of 4 minutes and 40 seconds at all of the displays and women spent an average time of 4 minutes and 20 seconds. Although males spent on average an extra 20 seconds at the exhibit, this is not significant enough to suggest that they enjoyed the exhibit more than females.

The age of a visitor in Hands-On-History had an impact on enjoyment. Younger visitors enjoyed the exhibit more than older visitors, as shown in Table 4. As visitor age increases the percentage of visitors that said they enjoyed the exhibit decreases.

Table 4: Percentage of age groups that enjoyed the exhibit

Demographic Breakdown		**Percentage of People who enjoyed the exhibit**
Age:	10 and Under	100.0%
	11-17	100.0%
	18-25	98.4%
	26-35	97.2%
	36-49	96.7%
	50+	97.1%

The exception to this is the last age range of 50 and older which had a slightly higher percentage of enjoyment than 36-49 age range.

The average time spent at the entire exhibit for the different age ranges is displayed in Table 5.

Table 5: Total average time spent through HOH by age group

Age	Avg. Time Spent (Min:Sec)
1-15	6:12
16-25	4:52
26-39	4:42
40+	4:30

From this table we can see that visitors under the age of 15 clearly spend more time at the exhibit, spending nearly 90 seconds more than all the other age groups. Although there is little time difference among the other ages, the average time slightly decreases as age increases. In addition, Figure 14 breaks down how much youth and adults interacted with each display.

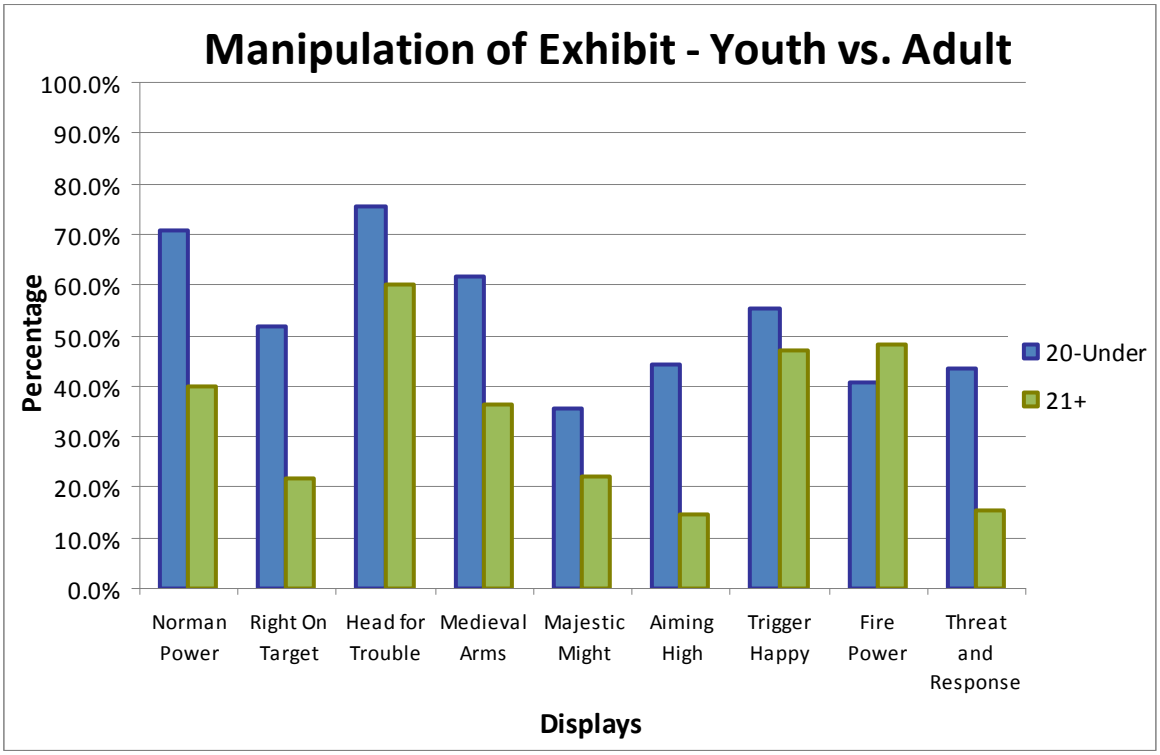

Figure 14: Manipulation of displays (Youth vs. Adult)

Looking at the overall trend rather than each display individually, the graph indicates that people under the age of 20 interacted with displays significantly more than people over 20. These observation results combined support the conclusion from the surveys that younger visitors enjoy the exhibit most.

Because the Tower of London is a major tourist attraction, it is common for the population to be made up of many non-English speaking visitors. Of the 762 visitors who we surveyed, there were an additional 104 visitors who were approached but were unable to respond due to a language barrier. Although we were unable to gain feedback from visitors who did not speak English, it is likely that language had some impact on their experience. From the visitors we surveyed who could provide feedback, we found that 95.6% of visitors having a preferred language other than English enjoyed the exhibit; whereas 98.6% of visitors whose first language was English enjoyed the exhibit. Even though there is a small difference, 95.6% is a large enough number to show that the exhibit was effective in providing enjoyment to visitors whose preferred language was not English.

4.3.2 Individual Displays

Hands-On-History was created to entertain visitors while trying to also teach them about arms and armor. Certain displays were able to contribute more to the enjoyment which was analyzed from our surveys and observations. We were able to develop a pie chart to show which displays were enjoyed the most. According to Figure 15, "Right On Target" was found to be the most enjoyed display, followed by "Norman Power" and "Heading for Trouble."

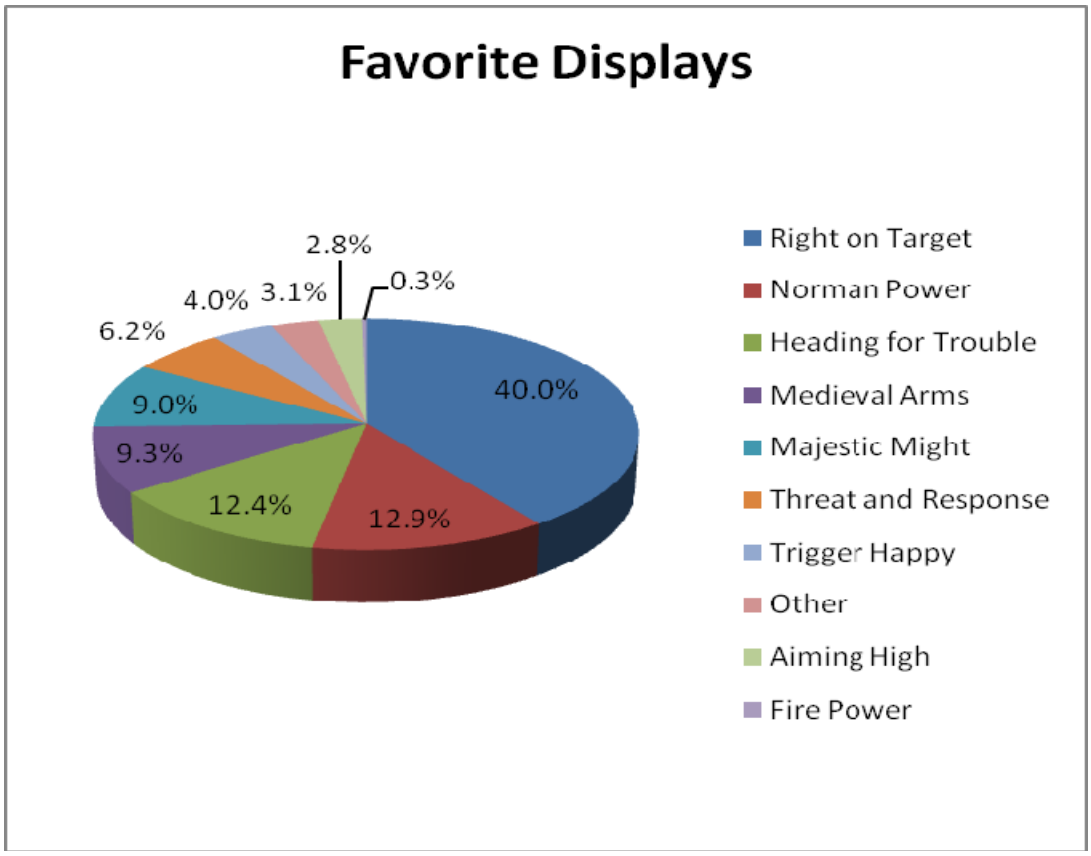

Figure 15: Favorite Displays

It would be clear to anyone observing Hands-On-History within a short amount of time that the display "Right on Target" is a favorite to most visitors. We analyzed the results of what each individual claimed to be their favorite display and found that for every age, gender and language, "Right on Target" was the most enjoyed exhibit. Observations also showed this display to be the one that visitors spent the longest average time at, as shown in Appendix V.

The two displays that were found to be the most enjoyable are the two that are most competitive. This competitiveness also contributed to visitors spending the longest average time at both displays. If there was not a large crowd, most visitors who interacted with "Right on Target" would pull the bow back time after time until they had achieved their goal of lighting up the square that said "Dead on Target." In the the display "Norman Power," visitors will try and answer a question correctly by picking up the correct weapon. Visitors rarely quit in the middle; almost all will continue picking up weapons until they have chosen the correct answer, where they then proceed to the next question. One distinct quality of "Norman Power" is that many visitors can participate at the same time. While watching others manipulate, the visitor not

directly interacting can can read the questions themselves and form their own answers to determine if they are "correct" or need to "try again."

The two displays that were least mentioned as being a favorite were "Fire Power" and "Aiming High." Many of the statements regarding "Fire Power" claimed it to be boring and said it did not fit into the room because there were no hands-on aspects to it. Our observation results showed that it was the most ignored display with 34.7% of visitors observed completely ignoring it. During our surveys, only 0.6% of visitors mentioned "Fire Power" as their favorite display, which is the same percentage of people who said the "Rats" on the display panels was their favorite part of the exhibit. It was also the display that people spent the shortest time viewing. "Aiming High" is a display that works properly only part of the time, which may have impacted many visitors' response to their favorite and least favorite display. Most people did not understand the purpose of it and commented that is was boring. From observations that were done of the individual displays, it was noted that after viewing "Aiming High" a large number of people left looking indifferent. Similar to "Right on Target," the goal of "Aiming High" is to shoot a projectile with a level of accuracy. However, visitors seemed estatic to achieve their goal in "Right on Target," where as "Aiming High" failed to captivate the visitors because the display was predictable and easy to hit the target.

The display that was said to be disliked almost twice as much as any other was "Threat and Response," in which Appendix T shows 22.2% commented on disliking it most. The second most-disliked display was "Fire Power" with 12.0% of visitor indicating they disliked it. "Threat and Response" caused the most controversy because of its modern theme. Although the intent was to give visitors a comparison of modern weaponry to past weaponry, many felt that it was out of place. A few visitors also had a hard time viewing the display, commenting that it was "too real." Appendix M, states the reaction of one mother who had a son in the military and had extreme difficulty viewing the display, stating, "It hit too close to home." Nonetheless, some visitors loved the display because they could observe modern day weapons.

During surveying and observation, we noticed that males and females had distinct trends while walking through Hands-On-History. Based on information gathered about the average time visitors spent at displays, the number of people who manipulated displays, and responses to favorite and least favorite displays, it was determined that men enjoyed those that were competitive. These competitive displays consisted of "Right on Target," "Aiming High," and

"Norman Power." The displays that were enjoyed the most amongst females – "Threat and Response," "Majestic Might," "Heading for Trouble," and "Medieval Arms," – also had less interactivity and competiveness. Figure 10 compares the average time males and females spend at each display. The displays that men spent a notably longer amount of time at were "Right on Target" and "Aiming High." These are two of the most competitive displays, as mentioned earlier, because the visitor's interaction leads to a successful or failed attempt. Figure 16 shows how often the different displays were manipulated.

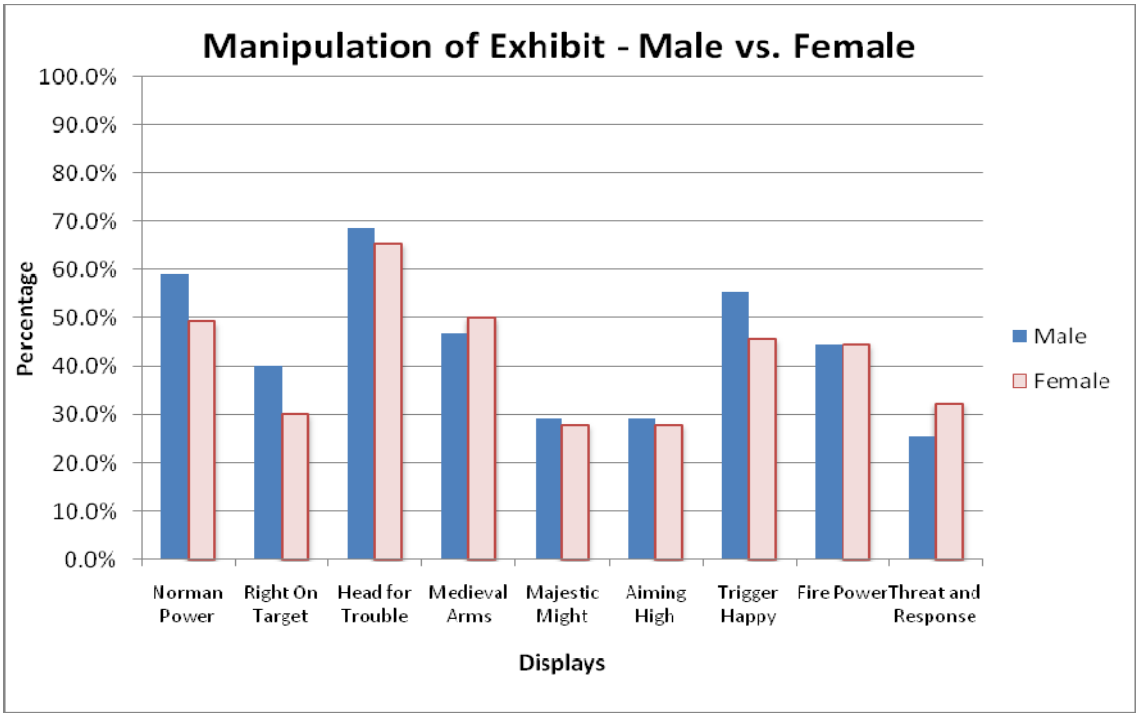

Figure 16: Manipulation of Displays (Male vs. Female)

"Norman Power" and "Right on Target" had the two largest differences between males and females, again showing males higher level of interest in competition. Finally, by observing the results of the survey question asking visitors for their favorite display, "Right on Target" had the largest difference between males and females. Results showed 42.2% of males stated it to be their favorite display, compare to 36.7% of females. Appendix Q shows how often each display was stated to be a favorite, comparing males and females.

Although men enjoyed competitive displays most, females enjoyed displays with different characteristics. Figure 10 indicated females spending more time or close-to an equal

time as males at displays requiring little involvement like “Threat and Response,” “Majestic Might,” and “Medieval Arms.” Figure 16 shows that the displays “Threat and Response,” “Fire Power,” “Heading for Trouble,” “Majestic Might,” and “Medieval Arms” were manipulated by women more or nearly the same levels as men. These exhibits had more female interaction because they involved trying on a gauntlet, looking through a helmet, or hearing information from touching an object. Women were able to experience something from these displays that did not include as much competitiveness; instead they could participate at their own pace with no specific goal to achieve. Our surveys showed similar results for “Heading for Trouble,” where 14.4% of females mentioned it as their favorite display and only 10.2% of men said the same. These results showed that less-involving displays are more effective towards the female audience.

In order to see a broader view of how age affected a visitor’s experience at Hands-On-History, we have created Table 6 to present the top three displays for different age groups.

Table 6: Top Three Favorite Displays by Age Group

	10 and Under	11-17	18-25	26-35	36-49	50+
1st	Right on Target	Right On Target	Right on Target	Right on Target	Right On Target	Right on Target
2nd	Aiming High	Threat and Response	Head for Trouble	Norman Power	Head for Trouble	Norman Power
3rd	Medieval Arms	Norman Power	Norman Power	Head for Trouble	Majestic Might	Majestic Might

This table shows the top displays for children age 17 and under to be the same displays that children spend the most time at. Figure 13 also shows the average time spent at each display by youths and adults. This graph and table shows and reinforces the fact that youths spent the most time at “Right on Target,” “Norman Power,” “Medieval Arms,” “Aiming High,” and “Threat and Response." Youths enjoyed these displays most because they are interactive and competitive. They involve using the visitors’ skill and knowledge to pull the bow back the right distance, give the correct answer on a quiz about weapons, or shoot a cannon the proper distance. Our original perception was that youth would not be interested in displays that only speak or give information. However, our results showed that youths spent the most time at “Threat and Response,” a display that gives information when a weapon is touched.

Next, we analyzed the trends of the visitors in the adult age groups. Table 6 shows that people in the 18-25 age group had similar responses to the 26-35 age group, with their favorite displays being “Right on Target,” “Head for Trouble,” and “Norman Power.” Adults in the age

groups of 36-49 and 50+ had unique responses to the other age groups in that they both had "Majestic Might" as one of their favorite displays. According to our survey data, 12.7% of people in the 36-49 age group and 15.8% of people in the 50+ age group mentioned "Majestic Might" as their favorite display. In comparison, roughly 6-7% of visitors in the other age groups revealed it as their favorite; these values are shown in Appendix R.

Language had little impact on the enjoyment of individual displays with the exception of the the two audial displays: "Threat and Response" and "Majestic Might." For these two displays few people who stated that English was not their first language enjoyed these audial displays as can be seen in the table in Appendix S. Had the displays been translated the results most-likely would have changed. One visitor suggested that a book be located beside each individual display with a translation of the display for multiple languages .

4.3.3 Desire for more interactivity

Although the survey showed that 98.0% of the population enjoyed the exhibit, we determined whether visitors enjoyed the exhibit enough to want more interactive exhibits. With such a high enjoyment rate it was thought that a similar percentage would want to see more displays similar to Hands-On-History. However we found this was not necessarily the case. Figure 17 shows the how the overall population responded to the question of wanting more interactivity.

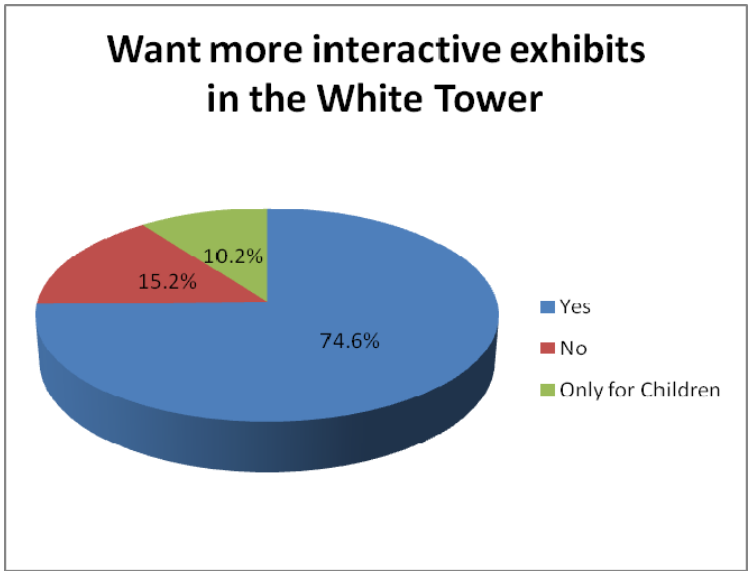

Figure 17: Percentage of Overall Population Wanting More Interactivity

Table 7 shows a breakdown of the overall population into different demographics of gender, age and language and how that impacted the responses.

Table 7: Percentage of Visitors Who Want More Interactive Exhibits

Demographic Breakdown		**Want more interactive exhibits in White Tower**		
		Yes	No	Only for Children
Overall:		74.6%	15.2%	10.2%
Gender:	Male	74.2%	17.6%	8.2%
	Female	75.0%	12.9%	12.1%
Age:	10 and Under	**97.1%**	2.9%	-
	11-17	87.4%	10.7%	1.9%
	18-25	80.2%	16.4%	3.4%
	26-35	77.4%	17.0%	5.6%
	36-49	62.1%	16.4%	**21.5%**
	50+	**58.3%**	**22.9%**	18.8%
First Language:	English	75.2%	14.3%	10.5%
	Non-Enlish	71.8%	19.4%	8.9%

The results from the table that are bolded show that more children would like to see an increase in interactive exhibits, in comparison to adults over 50. The percentage of visitors who want more hands-on exhibits decreases with each increasing age range. Although age had a large impact on interactivity, gender and language preference had little to no impact on visitors wanting more interactive displays throughout the White Tower.

It was intended to keep the answer to the question for more interactivity to a yes or no, but we discovered that a large number of people were stating that they only wanted to see more interactivity for children. Because this answer was not as simple as a yes or a no, it was made its own separate category. We identified that most of the people who stated that they wanted more interactive exhibits for children were in the age ranges of 36-49 and 50 and older. The reason for this is that so many of the adults responding this way had children of their own and were excited to see an exhibit that would entertain and educate their children. One woman stated that “it is great for children; it finally gives them something to do.”

While some adults may only want more interactive exhibits for children, many of them think the exhibit is intended only for children and may be discouraged to say they enjoyed the exhibit and would like to see more. This impression may come from other museums that adults have visited that have hands-on exhibits designed for children only. For example, the Science Museum in London contains many exhibits that are geared towards children, such as the Launch

Pad and the Basement. Some adults may also have entered the exhibit when a classroom made up a major part of the population and assumed that children were the intended audience.

Although a majority of the visitors surveyed wanted more interactive exhibits, many did not have a strong opinion one way or the other. Several suggestions were also given about wanting more interactivity, but having it spread out throughout the White Tower rather than congested into one room. Although many would like to see more exhibits like Hands-On-History, there were some that were completely content with the current set-up.

4.4 Summary

The Hands-On-History exhibit performed well in terms of attendance, learning, and enjoyment. Other researchers have identified specific criteria for determining the effectiveness of museum exhibits in terms of both attendance and learning. In a widely cited study of several past exhibit evaluations, Beverly Serrell has defined two useful quantitative measures of success; as discussed by George Hein:

> "Serrell summarized a large number of tracking and timing studies in support of her proposal that a 'successful' exhibition be defined as one in which:
>
> - 51% of the visitors stop to attend at least 51% of the [displays]
> - Visitors can correctly quote or recall specific facts, attitudes, or concepts related to the exhibition elements or the exhibition's objectives."

Both of these criteria are met by the Hands-On-History exhibit. From the observations conducted we found that about 88.0% of visitors attended at least 51% of the displays. This is much higher than the 51% required for the exhibit to be considered a success. These criteria are not easy to meet; of the 48 studies Serrell conducted, only 5 exceeded this 51% benchmark (Hein 1998). This suggests that Hands-On-History is above average.

The second criterion developed by Serrell suggests that 51% of a sample of visitors, immediately after viewing the exhibition, should be able to express general or specific attitudes or concepts that are related to the exhibition's objectives (Hein 1998). We surveyed over 750 visitors if they felt they learned something and 87.3% indicated that they did. We then asked the visitors if they could provide an example of something they had learned. The results showed that

67.1% of the visitors surveyed could identify an example of something specific that they had learned. Responses in the last column of Appendix A ranged from concepts as general as the "history of England" to concepts as specific as "limited visibility experienced through a knight's helmet."

This overall percentage shows that the exhibit performed well against Serrell's criterion for learning, but a more detailed discussion of learning in terms of demographics was carried out. The data shows that gender had some effect on learning, whereas age and language had little to no effect. Survey results showed little difference between males and females who felt they had learned, but observation results concluded that males spent more time at the displays and for that reason may have learned more from the exhibit than did females.

The effects of different demographics on enjoyment differed significantly from learning. Where age had no effect on learning, it did significantly impact visitor enjoyment. It was discovered that youths enjoyed the exhibit more than adults, with the self-reported level of enjoyment slightly decreasing with each increase in age range. Enjoyment in terms of gender only differed in children under the ages of 20. We found from our data that males under the age of 20 enjoyed the exhibit more than females under the age of 20. In general, they had a higher level of interest increasing their overall level of enjoyment. In addition, language preference had no major effect on reported levels of enjoyment.

The last inquiry into the effectiveness of the exhibit was in terms of each individual display. Based on our surveys, observations of visitors, and observations of the individual displays themselves we determined the level of effectiveness of each of the displays in terms of our criteria: enjoyment, learning and attendance.

Table 8: Effectiveness of Individual Displays

Display	Enjoyment	Learning	Attendance	Overall
Aiming High	Poor	Poor	Good	**Poor**
Fire Power	Poor	Poor	Poor	**Poor**
Heading for Trouble	Excellent	Good	Excellent	**Excellent**
Majestic Might	Good	Good	Good	**Good**
Medieval Arms	Good	Good	Good	**Good**
Norman Power	Excellent	Excellent	Excellent	**Excellent**
Right on Target	Excellent	Good	Excellent	**Excellent**
Threat and Response	Good	Good	Good	**Good**
Trigger Happy	Good	Excellent	Good	**Good**

The effectiveness of each display within each category was judged to be excellent, good, or poor. A rating of excellent was given to those displays that were effective and stood out in some way. A rating of good was given to displays that were effective, but not prominent. Displays were rated poor when our findings suggested that they were in need of attention. Where there was inconsistency in rating them overall, we weighed enjoyment as being most important and attendance least important.

Table 8 displays the results. One display that should be noted is "Aiming High." The display does not always function properly, which may have impacted its level of enjoyment and attendance, but this had no impact on its learning rating.

The fact that Norman Power is far more interactive than Fire Power and that it well outperformed Fire Power as indicated in Table 8 is no coincidence; within Hands-On-History, greater interactivity lead to greater enjoyment, learning and attendance. In addition, since the exhibit is more interactive than others in the White Tower, it is more effective in the same areas.

5. Recommendations

Our research and analysis of Hands-On-History has proven that it is an effective exhibit. After taking a closer look at our results, we have developed several recommendations to improve an already successful exhibit. These recommendations include the improvement of awareness of the exhibit, increase in the amount of interactive exhibits at the Tower site, enhancement of certain displays in the room, and areas requiring further research.

5.1 Awareness of Hands-On-History Exhibit

Hands-On-History has proven to be an effective exhibit in which 56.7% of visitors entering the Tower of London view. Despite its success, only 6.3% of visitors know about Hands-On-History before they entered the White Tower. Of this small percentage, the majority of the visitors had only heard of the exhibit because they had been there before. Several visitors were observed leaving the exhibit stating to a family member or friend that they wish they had known about this exhibit, because they would have factored in more time to view Hands-On-History.

Although visitor's lack of prior knowledge of the exhibit is one of the Royal Armouries' largest problems regarding the exhibit, it is also one of the simplest to solve. With increased marketing at the Tower of London site and in nearby areas, visitors can be made more aware of the exhibit. *Learning from Museums: Visitor Experiences and the Making of Meaning* suggest to "…use marketing to provide meaningful connections with the institution, to build a positive motivation for a visit (Dierking and Falk 2000)." About 2.5 million people enter the Tower of London each year; with this being such a large number we do not suggest that much money or effort be put on advertisement outside of the Tower complex. Instead we advise that more signs be put up throughout the site advertising the only interactive exhibit in the Tower.

An increase in advertisement could also contribute to a more even flow of visitors throughout the day. From the three days of counting we noted that visitors do not start entering the Hands-On-History exhibit until just before 10:00am. That leaves the exhibit empty for the first hour it is open. The Tower of London is currently set up so that a majority of its visitors enter the White Tower last. With better advertisement, more visitors may visit the White Tower at the beginning of their visit when the exhibit is less crowded. By increasing attendance in

earlier hours, it would reduce the population during later hours of the day, decreasing crowding and providing a more pleasant experience for all of the visitors.

5.2 Desire for More Interactive Exhibits

Results from a survey question asking visitors if they would like to see more interactive exhibits in the White Tower showed 74.6% of visitors said yes, 15.2% said there was enough interactivity, and 10.2% said yes but only for the sake of children. Although a majority of people said they would like more interactive exhibits in the White Tower, many said they would enjoy the interactivity more if it was spread out.

As such, we recommend adding more interactive exhibits, but we suggest distributing them throughout the Tower complex. By distributing the interactivity, many of the current issues of crowdedness and lack of marketing would be solved. If interactive exhibits were located throughout different towers, visitors would not have to reserve time at the end of their visit, and could instead interact as they went along. This solves the marketing issue because as long as visitors are entering some of the towers they will eventually encounter an interactive exhibit, regardless of whether they knew about it. The other advantage to spreading out the exhibits is that visitors would not be held up in one room trying to attend and interact with all of the displays, reducing crowding.

5.3 Improving the Individual Displays

The display that visitors of all different ages, genders, and languages agreed to have enjoyed the most is, not surprisingly, the display that attracts largest crowds. Over 750 visitors were surveyed and about 40.0% of visitors responded that "Right on Target" was their favorite display. This competitive display consistently draws the largest crowd out of all of the displays. With such a high level of enjoyment it is unfortunate that many of the people surveyed said they liked the display but were unable to take an attempt at drawing back the bow because the display was too crowded.

We recommend that a second, similar bow be added to "Right on Target." By adding a second bow the crowd would be reduced to half its normal size, by allowing twice as many people to interact at the same time. Allowing multiple visitors to participate at the same time has resulted in the display "Heading for Trouble," which has three helmets for visitors to look into,

usually having the smallest line or crowd of people waiting to interact. "Right on Target" takes a longer time to interact with than "Heading for Trouble" so it is understood that a second bow will not completely solve the problem of a crowd, but it will increase the rate at which people move by the display.

As the table in the summary section of Results and Analysis shows, "Fire Power" is an extremely ineffective display. Few people learned anything from the display, and it is the only display that is not interactive in some way. While observing the display we noticed several of the visitors walk up to the screen and touch it, assuming that it was a touch screen as everything else in the exhibit is hands-on. Judging by attendance and visitor comments, the data reveals that "Fire Power" is the display in need of most attention. We recommend removing this display altogether. The display is ineffective in terms of attendance, learning, and enjoyment and does not fit in with the rest of the exhibit.

Another frequently ignored display is "Aiming High" with an "ignored" rate by observation of 27.3%. Visitors are less captivated by this display because of its simplicity and lack of suspense. The enemy that is supposed to move around is broken most of the time, making it even less challenging to hit the target. Additionally, the crank that controls the canon has only has three levels in which to aim, again making this display not very challenging. We suggest repairing the display so that the enemy moves at a faster speed, and allowing the canon to be fired from a greater number of angles allowing the visitor to aim where they want.

Finally, 22.2% of visitors said that they disliked "Threat and Response," regardless of the fact that it was one of the top displays for amount of time visitors spent attending. It was also said to be the favorite display of about 6.0% of visitors surveyed. However, the display caused much controversy because its modern characteristics were said to be out of place in the Hands-On-History exhibit and the White Tower. Relocating the display out of the White Tower and into the Fusilier Museum would be a more appropriate location, and, with a smaller visitor flow, it would be more highly appreciated.

5.4 Areas of Further Research

The White Tower consists of three floors of exhibits with lengthy spiral staircases leading people from one floor to the next. By the time many visitors finally enter the top floor they are tired and are searching for the exit or a place to sit down and catch their breath. As noted in the

attendance section of the results and analysis chapter, it is stated that 85.9% of visitors entering the White Tower enter the Hands-On-History exhibit. This means that only about 14% of the people entering the Tower do not make it up to the third floor. While fatigue and a lack of time may play a large impact on these numbers, another contributing factor is that those who are unable to access the top floor because of physical handicaps. As discussed in the methodology chapter we interviewed a group of special needs students who had viewed Hands-On-History and found that their largest complaint were the stairs and the lack of accessibility to the top floor. We realize that installing lifts is an unlikely solution, so we recommend moving Hands-On-History to the first floor the White Tower.

Relocating Hands-On-History to the first floor could contribute to solving many of the exhibit's current problems. Visitors would be more aware of the exhibit since it would require only their entrance into the White Tower for them to view the exhibit. Most importantly, by moving the exhibit it would allow those unable to climb to the top floor a chance to view it. It is noted, however, that by moving the exhibit to the first floor it may have negative effects on the other exhibits that would be moved from the first floor to upper levels. The exhibits relocated to the higher levels may not be viewed by some visitors for the same reason of being fatigued at the top floor.

After many months of use, the display "Medieval Arms Race" has begun to undergo some damage in that the swords have become very loose in their bindings. This may be due to simple wear-and-tear, but an improper use of these items is most-likely the main cause. After weeks of observation, we discovered that many of the visitors believe the display to be a "swordfight," ensuing in a clashing of swords. Once a group of people begin to swordfight, visitors in line want to try it as well.

In order to make the display more clear in its intention – to experience being a soldier on a horse holding a sword and reigns – we recommend looking into other options. The first option would be to move the swords further apart toward the outside of the display and to bring the reigns to the inside. This would mean that one gauntlet set would be left-handed and the other would be right-handed. Another option would be to install a piece of Plexi-glass, or other suitable material, between the two sets of swords so that people know not to fight with each other. Finally, since the display represents a soldier on horseback, a set of stools decorated as a saddle

could be installed in front of the display. This would allow visitors to better experience what it was like to be on horseback.

After working observing and surveying visitors, we have concluded that the exhibit is less appealing in terms of enjoyment to people who do not speak English. All of the displays in the exhibit are presented in English with no option of translation. In particular, the displays "Majestic Might" and "Threat and Response" are be most difficult for non-English speakers. When triggered, these exhibits give information about the weapons in English with no method of translation. Many observed visitors who were non-English speaking would not know to touch the objects at these displays until another person would come and interact with them. They would then appear dissatisfied to hear the information given in a language they don't understand. Although this is a major issue at Hands-On-History, it is unfeasible to provide audial translations to address everyone. We recommend investigating different ways to improve the exhibits appeal to different languages, such as pamphlets or placards on the wall with translations.

Finally, it should be noted that the recommendations developed are a result of Hands-On-History's successes rather than failures. Because the exhibit is so effective in providing enjoyment it has a consistently large flow of visitors in and out of the exhibit. The recommendations emphasized most, are those that will allow more people the opportunity to view and interact such an effective exhibit.

6. Conclusion

The Royal Armouries invested a considerable amount of time, effort, and funds in designing and constructing a new exhibit called Hands-On-History. However, they did not create any standard way of assessing its success or seeking visitor feedback. In order to fill this gap, we developed two objectives – we sought to determine, through surveys, observation, interviewing, and counting, the visitor flow rates through points in the Tower and visitors' responses to the exhibit. These methods provided us with a broad body of data, some of which was quantitative and some qualitative. In order to evaluate the exhibit, we analyzed the data according to three measures of effectiveness: exhibit attendance, visitor learning, and visitor enjoyment.

Based on analysis of the data, Hands-On-History is an effective exhibit. We found that 56.7% of visitors entering the Tower of London view one or more displays in Hands-On-History; and of those visitors one-third of them viewed all nine displays in the exhibit. Our analysis also showed that 98.0% of visitors enjoyed the exhibit, 87.3% of visitors felt they had learned something, and 84.8% want to see more exhibits similar to Hands-On-History. Very few exhibits or museums could provide numbers similar to these (Hein 1998).

There are certainly limitations to the exhibit's ability to engage and teach visitors to the Tower of London. Hands-On-History has shown itself to be effective despite factors such as the exhibit's location on the top floor of the White Tower, the exclusive use of the English language in labels and explanations, and the large number of visitors moving through it each day. It is no coincidence that some of the most effective displays are also the most interactive. Very few exhibits or museums would be able to match these high levels of visitor attendance, learning or enjoyment (Hein 1998).

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Appendix A

Person	Language	Enjoy Exhibit	Favorite Exhibit	Least Favorite	Felt They Learned	Know about HOH prior	More Interactivity	Gender	Age	What was learned
1	E		Tr---N	-	N	N		F	E	
2	N		Th	Me	Y	N		M	B	Use of weapons
3	N				Y	N		F	B	How it was to wear armor
4	N				Y	N		M	C	
5	E		H		Y	Y-Been before		F	A	Henry VIII was big
6	E		Th		Y	N		M	F	Evolution of Armor
7	E		N		Y	N		F	E	Heaviness of weapons
8	N		R		Y	N		M	D	Poor visibility of helmet
9	N		R		Y	N		M	E	Use of weapons
10	N		Ma	Stairs	Y	N		M	B	About weapons
11	E		R		Y	N		M	D	Legacies of famous people
12	N				Y	N		M	F	
13	N		R	Me	Y	N		M	D	Heaviness of weapons
14	E		R		Y	N		M	B	How far to draw a bow back
15	E				Y	N		F	F	Heaviness of weapons
16	E		R		Y	N		M	B	Use of weapons
17	E		Ma		Y	Y-Been before		M	F	Heaviness of weapons
18	N		A		Y	N		F	E	
19	E		A	Too Gory	Y	N		M	A	Armor was bad, has improved over time
20	N		Me		Y	N		F	E	History of weapons
21	E		R	Th	Y	N		F	D	
22	E		Th---Tr		Y	N		F	F	
23	E		R		Y	N		M	B	How life used to be
24	E		coins		Y	N		M	F	
25	N				N	Y		F	B	
26	N		roof	Th-too modern	N	N		F	D	
27	E		R		Y	N		M	A	Had to cover horses
28	N				Y	N		F	D	About weapons
29	N		N		Y	N		M	E	
30	E		R		Y	N		F	F	About weapons
31	E		R	N	Y	N		M	A	Heaviness of weapons
32	E		Me		Y	N		M	B	Heaviness of weapons
33	E		Th		Y	N		F	F	About current weapons
34	N		H	Th	Y	N		M	F	Difficulty of fighting with armor
35	N		A		Y	N		F	E	Uses of White Tower
36	E		Tr		Y	N		F	E	Heaviness of weapons
37	E		R		Y	N		F	F	Uses of White Tower
38	E		Th		Y	N		F	C	History in general
39	E		N	A	Y	N		F	E	Sense of time
40	N		N		Y	N		M	E	Types of Arms
41	E		R		Y	N		M	C	
42	E		R		Y	N		M	D	Heaviness of weapons
43	E		Tr		N	N		F	F	
44	E		R	F	N	N		F	B	
45	E		R	A	N	N		M	C	
46	E		N	F	Y	N		M	C	History in general
47	E	Y	N---R	Me	Y	N		M	C	
48	E	Y	H		Y	N		F	F	Difficulty of fighting with armor; Poor visibility of helmet
49	N	Y			Y	N		M	E	Power of musket
50	N	Y	R		Y	N		F	E	Use of weapons

51	N	N						F	D	
52	E	Y	N		Y	N		M	C	
53	E	Y	Tr		Y	N		M	F	
54	E	Y	R	coins	N	N		M	C	
55	N	Y		A	Y	N		F	E	Heaviness of weapons
56	E	Y	coins		Y	N		M	D	
57	E	Y	rat					F	F	
58	E	Y	H		Y	N		M	C	Poor visibility of helmet
59	E	Y	Ma---Th		Y	N		F	E	
60	E		R		Y	N		M	F	How far to draw a bow back
61	E		Ma		Y	N		M	E	
62	E		R		Y	N		F	C	
63	E				Y	N		F	C	Use of weapons
64	E	N			Y	N		M	F	
65	N	Y	R		Y	N		M	C	Use of weapons; Poor visibility of helmet
66	E	Y	N		Y	N		M	F	
67	N	Y	N		Y	N		F	F	About weapons
68	E	Y	R		Y	N		M	C	
69	E		R		Y	N		M	B	
70	E		R	Me	Y	Y-Online		M	E	
71	E		R		Y	N		F	C	
72	N		R		N	N		F	B	
73	E		R	A	Y	N		M	B	Use of weapons
74	E				N	N		M	F	
75	N		R		Y	N		F	E	
76	E		Ma		Y	Y-Read somewhere		F	E	
77	N		H	F	Y	N		M	B	
78	N	N	H		Y			F	C	
79	N	N	H		Y			M	E	
80	E		R		N	N		F	A	
81	N	Y	R		Y	N		F	B	Use of weapons
82	N	Y	R		Y	N	Y	F	E	Poor visibility of helmet
83	N	Y	R		Y	N		M	B	
84	E	Y	A--H--Tr		Y	N	Y	F	E	Use of weapons
85	N	Y	R		Y	Y	Y	F	D	About suit of armor
86	E	Y	R		N	N	Y	M	A	
87	E	Y			Y	N	Y-kids	M	E	Heaviness of weapons
88	N	Y	Me		Y	N	Y	F	B	
89	E	Y	N	F	Y	N	Y-kids	F	E	Use of weapons; Visibility
90	N	Y	R		Y	N	Y	F	B	How to fight
91	N	Y	R	H---F	Y	N	Y	M	B	How necessary arms are
92	E	Y	N	H-smelled	Y	N	Y	F	E	Use of weapons
93	E	Y		crowded	N	N	N	M	D	
94	N	Y	R	Th	Y	N	Y	M	C	
95	E	Y	Me---R---coins		Y	N	Y	F	D	
96	N	Y	Me		Y	N	N	M	C	
97	N	Y			Y	N	Y-kids	M	B	Heaviness of weapons
98	E	Y		H-smelled	Y	N	Y	M	E	
99	E	Y	Th		Y	N	Y	F	F	About modern weapons
100	E	Y	Timelines		Y	N	N	F	E	Visibility

101	E	Y			Y	N	Y	M	F	About weapons
102	E	Y	H		Y	N	Y-kids	F	E	
103	E	Y	N		Y	Y	N	M	F	
104	E	Y	Th		Y	N	Y	M	F	
105	E	Y			Y	N	Y-kids	F	E	About modern weapons
106	E	Y	Me	F	Y	N	Y	F	E	
107	E	Y	H		Y	N	Y	M	D	What it is like to wear helmet
108	E	N			N	N	Y-kids	F	E	
109	N	Y	R		Y	N	Y	M	C	Visibility; Heaviness of weapons
110	N	Y			Y	N	Y	F	D	About weapons
111	E	Y	R		Y	N	Y	F	D	Heaviness of weapons
112	E	Y	R	crowded	N	N	Y	F	B	
113	N	N			Y	N	Y-kids	M	E	How bullets pierce armor
114	E	Y	H		Y	N	Y	M	C	About weapons- evolution of them
115	E	Y	R		Y	N	Y	M	E	About weapons-what weapons felt like
116	E	Y	N		Y	Y-friend	Y	F	E	About weapons
117	N	Y			Y	N	Y	M	C	Visibility
118	E	Y	R		Y	N	Y	M	D	What weapons felt like
119	E	Y	R		Y	N	Y	M	B	Use of weapons
120	E	Y	A	Me	N	N	Y	M	A	
121	E	Y	N		N	N	Y	M	D	
122	E	Y	R		Y	N	Y	M	E	Visibility
123	E	Y	N	A	Y	N	Y	M	B	About modern weapons
124	E	Y	Tr		Y	N	N	F	C	About modern weapons
125	E	Y			Y	N	N	M	E	
126	N	Y	R	coins	Y	N	Y	M	F	Better not to kill other people
127	E	Y	R		Y	N	Y	M	C	Visibility
128	N	Y	R	Me	Y	N	Y	M	D	
129	E	Y	R		Y	N	Y	F	E	About modern weapons
130	N	Y	A	Th	N	Y	N	F	E	
131	E	Y	R		Y	N	Y	F	B	Effects of weapons
132	E	Y	Th		N	N	Y	F	B	
133	N	Y	R		Y	N	Y	F	C	Bow is hard to pull back
134	E	Y	Ma		Y	N	N	M	E	Use of weapons
135	N	Y	Ma	coins	Y	N	Y	M	D	Armor protection
136	N	Y	H		N	N	Y	F	D	
137	E	Y	R		Y	N	Y	F	C	
138	E	Y	R		Y	N	Y	F	B	
139	E	Y	H		Y	N	Y-kids	F	E	Archery is not all about strength
140	N	Y	N		Y	N	Y	M	C	
141	E	Y	R		Y	N	N	M	C	Use of weapons
142	E	Y	R		Y	N	Y	F	C	Heaviness of weapons
143	E	Y	H	Ma	Y	N	Y	M	C	Heaviness of weapons
144	E	Y	Ma		Y	N	Y	F	E	Use of weapons
145	E	Y	N		Y	Y	N	F	D	
146	E	Y	Th		Y	N	Y-kids	F	E	About modern Uniform
147	E	Y			Y	N	Y	M	D	Heaviness of weapons
148	E	Y	N		Y	N	Y	M	A	Heaviness of weapons
149	N	Y	R		Y	N	Y	F	B	
150	E	Y	N	Th	Y	N	Y	F	E	Heaviness of weapons

151	E	Y	R		Y	N	Y	F	B	About modern weapons
152	E	Y	H		Y	N	Y	F	D	About history
153	E	Y	R	Th	N	N	Y	M	E	
154	E	Y	Th	coins	Y	N	Y	M	B	Use of Weapons
155	E	Y	R		Y	N	Y	F	C	Heaviness of weapons
156	E	Y	R		Y	N	N	M	D	
157	E	Y	R		Y	N	Y	M	D	
158	E	Y	N	Th	Y	N	N	M	F	About weapons-Wheel-lock vs Match-lock
159	E	Y	H		Y	N	Y	F	C	
160	E	Y	R	A	Y	N	Y	M	C	About weapons-Musket shot through inch of steel
161	E	Y	Th	crowded	Y	N	Y	F	E	What current soldiers are up against
162	N	Y	R		Y	N	Y	M	D	Use of Weapons
163	E	Y	R	Me	Y	N	Y	M	B	Use of Weapons
164	E	Y	R	Me	Y	N	Y	M	F	About weapons
165	N	Y	R	H	Y	Y	Y	F	B	
166	E	Y	R		Y	N	Y	M	E	About weapons; How to attack armor
167	E	Y	Ma		Y	N	Y	M	C	Heaviness of weapons
168	E	Y	R		Y	N	Y	F	C	Advancement of weapons throughout history
169	N	Y	N		Y	N	Y	F	D	About reigns and swords
170	E	Y			Y	N	N	M	F	
171	E	Y	R	F	N	N	N	M	C	
172	E	Y	R		Y	N	N	M	F	About weapons-Sequence of wheel locks and other locks
173	N	Y	R		Y	N	Y	F	B	
174	N	Y	N	Th	Y	N	Y	F	C	
175	E	Y	Timelines		Y	N	N	F	E	Would not want to hold a musket
176	E	Y			Y	N	Y	F	B	Use of Weapons
177	E	Y	R		N	N	Y	M	E	
178	E	Y	N		Y	N	Y	M	B	Use of Weapons
179	E	Y			Y	N	Y	M	B	
180	E	Y	N	F	Y	N	Y	F	C	About weapons
181	N	Y	R		N	N	Y	M	F	
182	E	Y	R	coins	Y	N	Y-kids	F	E	Heaviness of weapons
183	E	Y	R	Stairs	Y	N	N	M	E	Were awful living conditions
184	N	Y	R	Th	Y	N	Y	M	D	Use of Weapons
185	E	Y	R	Me	N	N	Y	M	B	
186	E	Y	R	Th	Y	N	Y	F	C	About weapons; Use of weapons
187	E	Y	H	A	Y	N	Y	M	E	Visibility
188	N	Y	N		N	N	Y-kids	M	D	
189	E	Y	Th---Ma	H	Y	N	Y	M	C	Heaviness of weapons
190	E	Y	Ma	Th	Y	N	N	M	C	
191	N	Y	Tr		Y	N	Y	F	D	History in general
192	E	Y			Y	N	Y	F	D	Heaviness of weapons
193	E	Y	Me		Y	N	N	M	A	
194	E	Y	R	H	Y	N	Y	M	B	
195	E	Y	Me		Y	N	Y	M	A	Use of modern weapons
196	E	Y	N	H	Y	N	Y	F	B	About coins
197	E	Y	H		Y	N	Y	F	B	
198	E	Y	Me		N	Y-other people	N	M	E	
199	E	Y			Y	N	Y	F	F	Heaviness of weapons
200	E	Y	Th---Ma	Me	Y	N	Y-kids	F	E	

201	N	Y	R		Y	N	Y	M	E	
202	E	Y	R		Y	N	Y-kids	F	E	About chemical protection
203	E	Y	H		Y	N	Y	F	A	Hard to fight
204	E	Y	Me		Y	N	Y	F	C	Armor is awkward
205	N	Y	R	F	Y	N	Y	M	C	History in general
206	E	Y	Me	F	Y	N	Y	F	C	Heaviness of weapons; types of weapons
207	E	Y			Y	N	Y	M	E	Heaviness of weapons
208	E	Y			N	N	Y	M	E	
209	E	Y	H		Y	N	Y	M	E	About armory and fighting
210	N	Y			Y	N	Y	F	E	About weapons
211	N	Y	Th---R		Y	N	Y	M	A	About weapons
212	E	Y	Tr---Th	crowded	Y	N	Y	F	F	About weapons; Heaviness of weapons
213	E	Y			Y	N	N	M	C	
214	E	Y	Ma		Y	N	Y	F	B	
215	N	Y	R--Ma--A--Me	H--Th	Y	N	Y	F	E	History of United Kingdom
216	N	Y	N		Y	N	Y-kids	M	E	
217	N	Y	Th		N	N	Y	M	B	
218	E	Y	R		Y	N	Y	F	C	About weapons-how they penetrate
219	N	Y	R	F	Y	N	Y	F	D	Heaviness of weapons; feel of the weapons
220	E	Y	Ma	crowded	Y	N	Y	F	C	
221	N	N		R	N	N	N	M	E	
222	E	Y	Me	coins--crowded	N	N	Y	F	E	
223	E	Y		crowded	N	N	Y	M	C	
224	N	Y			Y	N	Y	F	D	
225	E	Y		coins	Y	N	Y	M	D	Visibility
226	E	Y	Tr		Y	N	Y	M	A	Visibility
227	E	Y	R		N	N	Y	F	A	
228	E	Y	R		Y	N	Y	M	A	How to fire a bow and arrow
229	E	Y	H	Th	N	N		F	E	
230	E	Y			Y	Y-Been before	Y	M	F	
231	E	Y	R		Y	N	Y-kids	M	F	Heaviness of weapons
232	E	Y	Me	coins	Y	N	Y	F	C	
233	E	Y	R		Y	N	Y	F	E	Visibility
234	N	Y		Th	Y	N	Y-kids	M	E	
235	E	Y	Th---Ma		Y	N	Y-kids	F	C	
236	E	Y	A		N	N	Y	M	A	
237	E	Y	R---Me		Y	N	Y	M	E	Heaviness of weapons; Danger of weapons
238	E	Y	N		Y	N	Y	F	C	Would not be a good warrior
239	N	Y	R		Y	N	Y	F	E	About sword
240	E	Y	N		Y	N	Y	M	F	Smoke roof; Tower history
241	E	Y	Ma		Y	N	N	M	C	Use of weapons-efficiency
242	E	Y	H		Y	N	Y	M	E	About weapons
243	E	Y	Me		Y	N	Y	F	C	Use of weapons
244	E	Y	N		Y	N	Y	M	B	Use of Weapons
245	E	Y			Y	N	Y	M	E	Tension on bow
246	E	Y						M	E	
247	E	Y	H		Y	N	Y-kids	F	E	Change of weapons over the years
248	E	Y	Me		Y	Y-Another museum	N	F	D	Accuracy and tension of bow
249	E	Y	R		Y	N	Y	F	C	Heaviness of weapon
250	E	Y			Y	N	Y	M	F	Heaviness of weapon

251	E	Y	R		Y	N	Y-kids	M	E	Difficulty of using weapons
252	E	Y	R		Y	N	Y	F	B	About weapons
253	E	Y	Ma		Y	N	Y	F	C	
254	E	Y	Me		Y	N	Y	M	F	
255	E	Y	R		Y	N	Y	M	B	Heaviness of weapon
256	E	Y	Ma		Y	N	Y	F	C	About weapons
257	E	Y	Coins		N	N	Y	M	E	
258	E	Y	Ma		Y	N	Y	F	F	Visibility
259	E	Y	N	coins	Y	N	Y	F	F	Hold a sword
260	E	Y	R	Me	Y	N	Y	F	B	Difficult it was
261	E	Y	N		Y	N	Y	F	A	Use of weapons
262	E	Y	N		Y	N	Y	F	B	How to pull a bow back
263	N	Y	H		N	N	Y	F	F	
264	E	Y		crowded	Y	N	Y	F	A	
265	N	Y	N		Y	N	Y	F	F	
266	E	Y	R		Y	N	Y	M	B	
267	E	Y	N		Y	N	N	M	F	How to attack armor
268	E	Y	N		Y	N	Y-kids	F	D	Heaviness of weapons
269	N	Y	Me	Th	Y	N	Y	M	C	
270	N	Y	R	Tr	Y	Y-Been before	Y	M	C	Heaviness of weapons
271	E	Y	Th	H	Y	N	Y	M	C	About weapons-different types
272	E	Y	R		Y	N	Y	F	C	Heaviness of weapons
273	N	Y	N		Y	N	Y	F	C	About weapons- which need most skill
274	E	Y	A		Y	N	Y	F	E	Heaviness of weapons
275	N	Y	H--Tr--N		Y	N	Y	F	E	How it was in old centuries
276	N	Y	Tr		Y	N	N	M	D	About British weapons
277	E	Y	R--rats	F	Y	N	Y	F	D	About time
278	E	Y			N	N	Y	M	D	
279	E	Y	R		Y	N	Y	M	A	About Weapons--About road side bombs
280	E	Y			N	N	N	M	F	
281	N	Y	H		Y	N	Y	F	C	History in general
282	E	Y	R		Y	N	Y	M	B	About weapons and Use of weapons
283	E	Y	R		Y	N	Y	F	D	Heaviness of weapons
284	E	Y	H		Y	N	Y	F	C	Use of weapons
285	E	Y	N		N	Y-Been before	Y	F	E	
286	E	Y	R		Y	N	Y	M	B	Heaviness of weapons
287	E	Y		crowded	N	N	Y	F	F	
288	E	Y	N		Y	N	Y-kids	F	E	Heaviness of weapons
289	E	Y	R	F	N	Y-website	Y	M	C	
290	E	Y	R		Y	N	Y-kids	F	F	Heaviness of weapons
291	E	Y	R	crowded	Y	Y-leaflet	Y	F	E	Change of weapons over the years
292	E	Y	Me	Th	Y	N		M	B	History of weapons
293	E	Y	R	Me	Y	N	N	M	B	Use of weapons
294	N	Y	R		Y	N	Y	F	E	Heaviness of weapons; Use of weapons
295	E	Y	N	Th	Y	N	Y	M	F	
296	E	Y	N		Y	N	Y	M	D	Heaviness of weapons
297	N	Y	Ma	H	Y	N	N	F	E	Use of weapons
298	E	Y	H--R--timeline		N	N	Y	M	E	
299	E	Y	R	coins	Y	N	Y	M	E	History in general
300	E	Y	R		Y	N	Y	F	B	Visibility

301	E	Y	R	coins	Y	N	Y	M	C	How to dent armor
302	E	Y	Me		Y	N	Y	F	D	Heaviness of weapons
303	E	Y	Th		Y	N	Y-kids	F	C	
304	E	Y	Coins		Y	N	Y	F	C	History of sterling
305	E	Y	H		Y	N	N	F	E	
306	E	Y	R		Y	N	Y	M	A	Heaviness of weapons
307	E	Y	Me		Y	N	Y-kids	M	D	Heaviness of weapons
308	E	Y	R		Y	N	Y	M	F	History in general
309	E	Y	H		N	N	Y	M	C	
310	E	Y	Th		Y	N	Y	M	A	Use of weapons
311	E	Y	N	F	Y	N	Y	F	D	
312	N	Y	R		Y	N	Y-kids	F	B	Visibility
313	N	Y	R		Y	N	Y	M	F	Use of weapons
314	E	Y	R	coins	Y	N	Y	F	C	Heaviness of weapons; Visibility of weapons
315	N	Y	H	N	Y	N	Y	M	D	Difficulty and uncomfort of fighting
316	E	Y	R		Y	N	Y	F	E	Visibility
317	E	Y	R	F	Y	N	Y	M	A	How to fire a bow and arrow
318	E	Y	R		Y	N	Y-kids	F	C	
319	E	Y	R		Y	N	Y	F	D	About weapons
320	E	Y	R		Y	N	Y	F	B	Visibility
321	N	Y	H		Y	N	N	M	D	Heaviness of weapons
322	E	Y	R	A	Y	N	Y	M	B	Heaviness of weapons
323	E	Y	Me		Y	N	Y	M	E	
324	E	Y			Y	N	Y	F	F	Heaviness of weapons
325	N	Y	H		Y	N	N	M	E	Visibility
326	E	Y	R		Y	N	N	F	F	Heaviness of weapons
327	N	Y	Coins		Y	N	Y-kids	M	F	
328	E	Y	Ma		Y	N	Y	M	F	How fascinating history is
329	E	Y	R	F	N	N	Y-kids	M	E	
330	E	Y	coins		Y	N	N	M	D	About weapons
331	N	Y	R		Y	N	Y	M	D	History in general
332	E	Y	Ma	coins	Y	N	Y	F	E	
333	E	Y	R		Y	N	N	M	E	Heaviness of weapons
334	E	Y	N		Y	N	Y	F	D	Heaviness of weapons
335	E	Y	N	coins	Y	N	Y	F	C	Visibility
336	N	Y	Me		Y	N	N	M	D	Heaviness of weapons
337	E	Y	N		Y	N	Y	F	D	Use of weapons
338	E	Y	R		Y	N	N	F	E	Visibility
339	E	Y	H		Y	N	Y-kids	F	F	About modern weapons
340	E	Y	N		Y	N	Y-kids	F	E	Visibility; Use of weapons
341	N	Y			Y	N	Y-kids	M	E	Heaviness of weapons
342	E	Y			Y	N	N	M	E	Heaviness of weapons
343	N	Y	Me	Th	Y	N	N	F	B	History of England
344	E	Y			Y	N	N	M	F	Use of weapons
345	E	Y	H		Y	N	Y	M	E	Use of weapons
346	N	Y	H		Y	N	Y	F	C	Heaviness of weapons
347	E	Y	R		Y	N	Y-kids	M	F	History of England
348	E	Y			N	N	N	M	F	
349	N	Y	R		Y	N	Y	F	E	Heaviness of weapons
350	E	Y	H		Y	N	Y	F	D	Visibility

351	E	Y	H	coins	Y	N	Y	F	C	About weapons
352	N	Y			Y	N	Y-kids	M	D	Use of weapons
353	E	Y	R	Th-too modern	Y	Y	N	M	C	
354	E	Y	R		Y	N	Y	F	D	About weapons--restrictions
355	E	Y	R		N	N	N	M	E	
356	E	Y			Y	N	N	M	D	How armor is affected by weapons
357	E	Y	R		Y	N	Y	M	B	
358	E	Y	R		Y	N	Y	F	B	About Armor-Horse reigns
359	E	Y			N	N	Y	F	F	
360	N	Y	N	crowded	Y	N	Y	F	C	Use of weapons
361	E	Y			N	N	N	F	C	
362	E	Y		crowded	N	N	N	F	C	
363	E	Y	R		Y	N	Y-kids	F	F	Heaviness of weapons
364	E	Y			Y	N	Y	F	C	
365	E	Y			N	Y-told by someone	Y	F	C	
366	E	Y	Ma		N	N	Y	F	E	
367	N	Y	N--Ma	Tr	Y	Y-Guide	Y	F	E	Heaviness of weapons
368	E	Y			Y	N	Y	F	C	Heaviness of weapons
369	E	Y	R		N	Y-been before	N	F	D	
370	E	Y			N	N	Y	M	D	Visibility
371	E	Y	R		Y	Y	Y	F	A	History of England
372	N	Y	H	Th	Y	N	Y	M	C	About weapons-Power of a bullet
373	N	Y		crowded	Y	N	Y	M	D	History of killing people
374	E	Y	Th		Y	N	Y	M	B	About weapons
375	N	Y			Y	N	Y	M	C	About weapons
376	E	Y	Ma	crowded	Y	Y-Guide	Y	M	E	About of weapons-Arrow will kill you by infection
377	E	Y	Me		Y	N	Y	M	A	Heaviness of weapons
378	E	Y	N		Y	N	Y	M	D	About weapons-restricted movement
379	E	Y	R	coins	Y	N	Y	F	C	Difficulty of fighting
380	E	Y	R		Y	N	Y	F	D	Heaviness of weapons
381	E	Y	R		Y	N	Y	M	D	History of the different years
382	E	Y	N	Me	Y	N	Y	M	D	Use of weapons
383	E	Y			Y		Y	M	E	Use and feel of weapons
384	E	Y	R		Y	N	Y	F	B	Use of weapons
385	E	Y	H		Y	N	Y	F	C	About types of weapons
386	E	Y			Y	N	Y	M	F	History in general
387	E	Y	N		Y	N	Y	F	C	Heaviness of weapons
388	E	Y	Th		Y	N	Y	M	B	Use of weapons
389	E	Y	Me		Y	N	Y	F	D	Heaviness of weapons
390	N	Y	R	H	Y	N	Y	M	C	Heaviness of weapons
391	E	Y	Ma		Y	N	Y	M	E	Heaviness of weapons; power of musket
392	E	Y	R	crowded	Y	Y-Guide	Y	F	D	Visibility; Use of weapons
393	E	Y	A		Y			F	A	
394	N	Y	R		Y	N	Y	F	F	Heaviness of weapons
395	E	Y	Me		Y	N	Y	M	E	Heaviness of weapons
396	E	Y	R	F	Y	N	Y	F	E	Heaviness of weapons; Visibility
397	E	Y	Ma		Y	N	Y	M	E	How deadly weapons were
398	E	Y	R		Y	N	Y	M	A	"I am a good archer!"
399	E	Y		No fresh air	Y	N	N	M	E	Heaviness of weapons; Difficulty to use
400	E	Y			Y	N	Y	M	B	Heaviness of weapons; Use of Weapons

401	E	Y	R		Y	N		M	D	
402	E	Y	R		Y	N	Y	F	A	About Weapons
403	E	Y	Ma		Y	N	N	F	B	About Weapons
404	N	Y	R--N		Y	N	Y	M	A	
405	E	Y	R		Y	N	Y	F	E	Last Execution was in 1916
406	E	Y	H		Y	N	Y	F	E	History in General
407	E	Y	R	F	Y	N	Y	M	B	Visibility
408	E	Y	roof		N - history buff	N	Y	F	D	
409	N	Y	R		N - already knew	N	N	F	B	
410	E	Y			N	Y-Read somewhere	Y-kids	F	F	
411	E	Y	R		N	N	Y	F	D	
412	E	Y					Y	F	E	
413	E	Y	N	crowded	Y	N	Y	M	C	Use of Weapons
414	E	Y	H		Y	N	N	F	E	Changes from timeline
415	E	Y	R		Y	Y-Been before	Y	F	B	
416	E	Y	Me	crowded	Y	N	Y	F	C	
417	E	Y	H		Y	N	N	F	A	About Armor
418	E	Y	R		Y	N	Y	F	E	Heaviness of weapons; How hard it is to pull back bow
419	E	Y	H		Y	N	Y	F	C	timeline information
420	E	Y	N		Y	N	Y	F	F	Heaviness of weapons
421	E	Y	Th		Y	N	Y	M	B	
422	E	Y	A		Y	N	Y	M	D	Strength and Skill needed to pull a bow back
423	E	Y	R		Y	N	Y-kids	F	E	Heaviness of weapons
424	E	Y		N-above children's heads		N	N	F	E	
425	E	Y	R	crowded	Y	N	Y	F	A	
426	E	Y	Ma	A	Y	N	N	F	F	About modern weapons; About flint locks
427	E	Y	F		Y	N	Y	M	C	About weapons and armor- development
428	E	Y	H		Y	N	Y	M	B	About armor
429	E	Y	R		N	N	Y	F	C	
430	N	Y	Me		Y	N	Y	F	C	About weapons--bow
431	E	Y	H		Y	N	Y-kids	F	F	
432	E	Y	Th		Y	N	N	M	F	Use and effectiveness of armor
433	E	Y	R		Y	N		M	C	Visibility
434	E	Y	R		Y	N	Y	F	E	About modern weapons
435	E	Y	R		Y	N	Y	M	B	Feel of the weapons
436	E	Y	R		Y	N	Y	M	A	Difficulty of fighting
437	E	Y	A		Y	N	Y	M	A	History in General
438	E	Y	Ma			N	Y	F	F	
439	E	Y	Me		Y	Y-Been before	Y	M	A	
440	E	Y	R		Y	N	Y	M	E	Difficulty of pulling bow
441	E	Y	R		Y	N	Y-kids	F	F	About the Tower-last execution and tower history
442	E	Y	H		Y	N	Y-kids	M	E	About weapons
443	E	Y	R		Y	N	Y	M	E	Visibility
444	E	Y	N		Y	N	Y	M	C	History in general
445	E	Y	Th		Y	N	N	F	E	Visibility
446	E	Y	Me		Y	N	N	M	E	Heaviness of weapons
447	E	Y	N--Ma--H	F	Y	N	Y	M	F	Visibility
448	E	Y			Y	N	Y	M	C	About English military
449	N	Y			Y	N	Y	M	F	
450	E	Y	H		Y	N	N	F	E	

451	E	Y	Me		Y	N	Y	M	D	What it is like to be soldier of that time period
452	E	Y	R		Y	N	Y	M	F	About weapons-look and feel of them
453	E	Y	Me		N	N	Y	F	B	
454	E	Y			Y	N	Y	F	B	About weapons
455	E	Y	Th		N	N	Y	F	B	
456	N	Y	R		Y	N	Y	M	E	About life in the past
457	E	Y			Y	N	N	M	F	
458	E	Y	R		Y	N	Y	F	B	History in general
459	E	Y	R–H		Y	N	N	F	E	Heaviness of weapons; Visibility of weapons
460	E	Y	R		N	N	Y	F	D	
461	E	Y	R		Y	N	Y	M	F	Heaviness of weapons
462	E	Y	R		Y	N	Y	M	A	Use of weapons
463	E	Y	Me		Y	N	N	F	C	How real history was
464	E	Y			N	N	Y	M	E	
465	E	Y	Tr		N	N	Y	M	A	
466	E	Y	H		Y	N	Y	M	B	About armor
467	E	Y	Ma		N	N	N	M	E	
468	N	Y	H		Y	N	Y	F	D	
469	N	Y			Y	N	N	F	B	Heaviness of weapons
470	E	Y	R		Y	N	N	M	C	Use of weapons; Importance of weapons
471	E	Y	A	Th	Y	N	Y	F	E	
472	E	Y	R		Y	N	Y-kids	F	C	
473	E	Y			Y	N	Y	F	A	
474	N	Y	R	Th	Y		Y	M	D	Heaviness of weapons
475	E	Y			Y	N	N	M	F	
476	E	Y	Th		N	N	Y	M	E	
477	E	Y	R		Y	N	Y	F	A	
478	E	Y	Ma		Y	N	Y	M	B	Visibility
479	E	Y	R		N	N	Y	F	D	
480	N	Y	N		Y	N	Y	M	B	Use of weapons
481	E	Y	R		Y	N	Y	F	E	About weapons
482	E	Y			Y	N	Y	M	B	Use of weapons
483	E	Y	Th		Y	N	N	M	F	About armor-Advances
484	E	Y	Th--Ma		Y	N	Y	F	E	
485	E	Y			Y	N	N	M	B	
486	N	Y	Timelines		Y	N	N	F	D	About history
487	N	Y	R		Y	N	Y	F	D	Heaviness of weapons
488	N	Y	N		Y	N	Y	F	D	Heaviness of weapons
489	E	Y	A		Y	N	Y	F	E	
490	E	Y	R		Y	N	N	F	B	Heaviness of weapons
491	E	Y	Me		Y	N	Y	F	A	About Armor- What it felt like
492	E	Y	Me		Y	N	Y	M	C	About weapons
493	N	Y	N		Y	N	Y	M	F	History in general
494	E	Y	Me		Y	N	Y	F	B	Heaviness of weapons
495	E	Y	R		Y	N	Y	F	C	About weapons
496	E	Y	R	Th	Y	N	Y	M	E	About armor
497	N	Y	N	H	Y	N	Y	F	C	Heaviness of weapons
498	E	Y	R		Y	N	Y	F	F	Use of weapons
499	E	Y	N		Y	Y	Y	F	A	Heaviness of weapons and armor
500	N	Y	N		Y	N	Y	M	D	Use of weapons

501	N	Y	R		Y	N		F	B	
502	E	Y	Me		Y	N	Y	M	A	Visibility
503	E	Y	Ma		Y	N	Y	M	F	Use of weapons
504	E	Y	N		Y	N	Y-kids	F	E	About armor-how to wear it
505	E	Y	Ma		Y	N	Y	F	F	Visibility
506	E	N	R	Th		N		M	F	
507	E	Y	R		Y	N	Y	M	B	About weapons- wheel lock and flint lock
508	E	Y	Me		Y	N	Y	F	B	Visibility
509	E	Y			Y	N	Y	M	B	About modern weapons
510	E	Y	R		Y	N	Y	F	C	Use of weapons
511	N	Y	Me	A-boring		N		F	E	
512	N	Y	R		Y	N	Y	M	B	Use of weapons
513	N	Y	R	coins	Y	Y-online, friend	Y	F	B	About weapons- how they penetrate armor
514	N	Y	R	A	Y	Y-been before	Y	M	E	Heaviness of weapons
515	E	Y	R	Me	Y	N	Y	F	C	Heaviness of weapons
516	E	Y	R		Y	Y-friend	Y	F	C	Visibility
517	E	Y	R		Y	N	N	M	B	Heaviness of weapons; Visibility of weapons
518	E	Y	R		Y	N	Y	M	B	Use of weapons; How to aim a bow
519	E	Y	Me	F	Y	N	Y	M	D	Heaviness of weapons
520	E	Y	R		Y	N	Y	M	B	Heaviness of weapons
521	E	Y	R		Y	N	N	M	C	Heaviness of weapons
522	E	Y	Ma		Y	N	Y	M	D	About weapons- History and evolution
523	E	Y	R		Y	N	Y	M	F	Heaviness of weapons
524	E	Y	N		Y	N	Y	F	F	Heaviness of weapons
525	E	Y	R		Y	Y-Guide	Y	F	C	About weapons-bow
526	E	Y	R		Y	N	Y	M	F	
527	E	Y	R	A	Y	N	Y	M	B	Strength need to draw bow
528	E	Y	Ma		Y	N	Y-kids	F	E	About armor - evolution
529	E	Y	Me		Y	N	Y	M	C	History in General
530	N	Y	R		Y	N	Y	F	D	Visibility
531	E	Y	H		Y	Y	Y	F	C	
532	E	Y			Y	N	Y	F	E	learned about Henry the 8th
533	E	Y	Ma		Y	N	Y	F	D	About weapons
534	E	Y	Ma		Y	N	Y	F	F	About weapons - damage caused, Henry 8th
535	E	Y	R		N	Y	Y	F	B	
536	N	Y	R	Th	Y	N	Y	F	B	Heaviness of weapons
537	E	Y	Th		N	N	Y	F	B	
538	E	Y	Ma		Y	N	Y	F	B	About weapons
539	E	Y	Tr		N	N	Y	F	B	
540	E	Y			Y	N	Y	F	E	About weapons
541	E	Y	H		Y	N	N	F	C	
542	N	Y	N		Y	N	Y	F	C	Heaviness of weapons
543	E	Y	Ma		Y	N	Y	M	D	learned about Henry 8th - he was huge, and 300 lbs; about weap
544	E	Y	R	Th	Y	N	Y	M	E	About armor; how it felt to hold a sword
545	E	Y	H		Y	N	Y	F	F	
546	E	Y	Tr		Y	N	Y	F	E	Heaviness of weapons
547	N	Y	Me		Y	N	Y	F	E	the effort needed to go to war, the limitations
548	E	Y	R		Y	N	Y	F	E	Heaviness of weapons
549	E	Y	H		Y	N	Y	F	A	
550	E	Y			N	N	Y	M	D	

551	E	Y			Y	N	Y	F	A	
552	E	Y	H	Th	N	N	Y	M	F	
553	E	Y	R		Y	N	Y	F	C	Heaviness of weapons
554	E	Y			Y	N	N	M	D	Chronology (timeline)
555	E	Y	Me		Y	N	Y	F	D	Modern dangers
556	E	Y			Y	N	Y	M	D	
557	E	Y	R		Y	N	Y	F	B	Speed of bullets
558	E	Y			Y	N	N	F	C	
559	E	Y	H		Y	N	Y-kids	F	F	About weapons - damage caused, Henry 8th
560	E	Y	Ma		Y	N	Y	F	E	About weapons - use, Henry 8th
561	E	Y	R		Y	N	Y	F	D	Use of weapons
562	E	Y	Th		Y	N	Y	F	E	
563	E					N	Y	M	C	
564	N	Y			N	N	Y	F	C	
565	E	Y	Ma		Y	N	N	F	C	About weapons - evolution; history (timeline)
566	E	Y			Y	N	Y	M	E	Heaviness of weapons
567	N	N			N	N	N	M	C	
568	E	Y	H		Y	N	Y	F	B	
569	N	Y	R	Th	Y	N	Y	F	D	Use of weapons; history of weapons
570	E	Y	coins		Y	N	Y	F	C	About coins - what their images represent/mean
571	E	Y	Me		Y	N	Y	M	F	Heaviness of weapons; about ancient times
572	E	N				N	Y	F	E	
573	E	Y	Me		N	Y	Y	F	C	
574	E	Y	H		Y	N	Y-kids	M	E	
575	E	Y	Tr		N	N	Y	M	A	
576	E	Y			N	N		M	C	
577	E	Y	R		Y	N	Y-kids	F	E	
578	E	Y			N	N	N	F	F	
579	E	Y	N	A	Y	N	Y	F	D	It was hard to fight in armor
580	E	Y	R		Y	N	Y	F	E	
581	E	Y	R		Y	N	Y	M	F	Bow can shoot 300 yards
582	E	Y			Y	N	Y	F	C	
583	E	Y	R		N	N	Y-kids	M	E	
584	N	Y	H	Th	Y	N	N	M	F	
585	E	Y	R		Y	N	Y-kids	F	E	
586	E	Y	R		Y	N	Y	F	A	Use of weapons
587	E	Y	R		Y	N	Y	M	A	About bow - hard to pull back
588	E	Y			N	N	Y	M	A	
589	E	Y	N		Y	N	Y	M	A	
590		Y	R		Y	N	Y	F	D	Visibility
591	E	Y	Me		Y	N	Y	M	E	About weapons - feeling; difficulty of fighting
592	E	Y	A		Y	N	Y	M	A	Heaviness of weapons
593	E	Y	R		Y	N	Y	F	A	
594	E	Y			N	N	Y	M	E	
595	E	Y	Ma		Y	N	Y	M	E	About English history
596	E	Y	Th		Y		Y	M	A	
597	E	Y	H		Y	N	Y	F	E	About weapons - weight, size
598	E	Y	Tr		Y	N	Y-kids	M	F	About weapons - evolution
599	N	Y	Me	Th - too modern	N	N	Y	F	E	
600	E	Y	Th		N	N	Y	M	E	

601	N	Y	Tr		Y	N	Y	M	C	Power of musket
602	E	Y	N		Y	N	Y	F	F	About coins
603	E	Y	Ma		Y	N	Y	F	D	About guns
604	E	Y	Me		Y	N	Y	F	E	
605	E	Y	Th	Coins-boring	Y	N	Y	M	B	About weapons
606	N	Y	H		Y	Y-internet	Y	M	D	About History
607	E	Y	Th		N	N	Y	M	A	
608	E	Y	R	Th-out of place	Y	N	Y	M	E	Perspective
609	E	Y	R		Y	N	Y	M	E	Heaviness of weapons, difficult to fight
610	E	Y	Ma		Y	N	Y	M	D	Visibility
611	E	Y	R		Y	N	Y	F	A	
612	E	Y	R	Th	Y	N	Y	M	A	
613	E	N			N	N	N	F	D	
614	E	Y	H		Y	N	Y	F	E	Visibility
615	E	Y	Tr		N	N	Y	M	F	
616	E	Y	R		Y	N	Y	M	A	How to fight using bow
617	E	Y	Tr		Y	N	Y	M	E	About weapons - history
618	E	Y			N	Y-others told	Y	M	D	
619	E	Y	Th		Y	N	Y	F	E	Heaviness of weapons
620	E	Y	R	Me	Y	N	Y	F	B	About weapons
621	N	Y			Y	N	Y	F	B	About weapons, about armor
622	E	Y	Ma		Y	N	Y-kids	F	E	About weapons
623	E	Y			Y	N	Y	F	F	heaviness of weapons, weapon uses
624	E	Y	R		Y	N	Y	M	A	
625	N	Y	N		Y	N	N	M	D	Affects of weapons, heaviness of weapons
626	E	Y	R--roof		Y	N	Y	F	D	about the roof
627	E		N		Y	N	N	M	F	
628	E	Y	H	R	Y	N	Y	M	F	
629	E	Y	Tr--Ma		Y	N	Y	M	B	Heaviness of weapons
630	E	Y	Ma		Y	N	N	F	B	About weapons
631	N	Y	R		Y	N	N	F	C	Use of weapons
632	E	Y			Y	Y-friend	Y-kids	F	F	About modern weapons
633	E	Y	Me		Y	N	Y	M	A	Heaviness of weapons
634	E	Y	R		Y	N	Y-kids	F	E	About modern weapons
635	E	Y	R		Y	Y-been before	Y	M	A	About armor-why one wears it
636	E	Y	R		N	N	Y	M	B	
637	E	Y	N		Y	N	Y	M	A	Use of weapons
638	E	Y	Me		Y	N	Y-kids	M	D	History in general
639	E	Y	Th	coins	Y	N	Y-kids	M	E	About weapons-evolution of them
640	E	Y	N		Y	N	Y	M	E	Heaviness of weapons
641	N	Y	Me	coins	N	N	N	M	E	
642	N	Y	R		Y	Y-is a teacher	N	F	D	History in general
643	E	Y	Th		Y	N	Y-kids	M	F	History in general
644	E	Y	H		Y	N	Y	F	A	History in general
645	E	Y	Tr		Y	N	N	M	E	About weapons-evolution of them
646	E	Y	Me		Y	N	Y	M	E	About weapons-cannon projectile
647	E	Y	R		Y	N	Y	F	E	Visibility
648	E	Y	R		Y	N	Y	F	B	About weapons
649	E	Y	H		Y	N	Y	F	C	Use of weapons
650		Y	A	Me	Y	N	Y	M	A	Use of weapons

651	E	Y	R		Y	N	Y	F	A	Use of weapons
652	E	Y	N		Y	N	Y	M	C	Visibility; About weapons-how they feel
653	E	Y	Tr		Y	N	Y-kids	M	F	Heaviness of weapons
654	N	Y	H	crowded	Y	N	Y-kids	F	D	Heaviness of weapons
655	E	Y	A		Y	N	Y	M	A	Heaviness of weapons and armor
656	E	Y	F		Y	N	Y	M	C	About weapons-power of a gun
657	E	Y	Me		Y	N	Y-kids	F	E	About England- timeline
658	E	Y	Ma		Y	N	Y-kids	F	F	Use of weapons
659	N	Y	H		Y	N	N	M	D	Visibility
660	E	Y	N		Y	N	Y	M	E	Heaviness of weapons
661	E	N		crowded		N	Y	M	D	
662	E	Y	R		Y	N	Y	M	A	
663	E	Y	Th		Y	N	Y	F	E	Use of weapons; heaviness of weapons
664	N	Y			Y	N	N	M	D	About weapons- evolution of them
665	N	Y	R		Y	N	Y	M	C	Use of weapons
666	E	Y	R		Y	N	Y	M	B	Heaviness of weapons
667	E	Y	Me		Y	N	Y	F	C	Heaviness of weapons
668	E	Y	N		Y	N	Y	F	B	About modern weapons
669	E	Y	N		Y	N	Y	M	E	
670	E	Y	R		Y		Y	F	B	Visibility
671	E	Y	R	Th	Y	N	Y	M	C	Heaviness of weapons
672	N	Y	R		Y	N	Y-kids	M	E	
673	E	Y	coins		Y	N	Y-kids	M	E	About coins-how they were minted
674	N	Y	Me		Y	N	Y	M	E	Heaviness of weapons
675	N	Y	H		Y	N	Y	M	B	About modern weapons
676	E	Y	N	crowded	N	N	Y	F	E	
677	E	Y			Y	N	N	M	E	Use of weapons
678	E	Y	N		Y	N	N	F	B	About modern weapons-NBC suit
679	E	Y			Y	N	Y	F	E	Heaviness of weapons
680	E	Y	N		Y	N	Y	M	E	About weapons- flint lock and wheel lock
681	E	Y	Ma	H	Y	N	N	M	F	About weapons-length of the musket
682	E	Y	Ma		Y	N	Y	F	E	Heaviness of weapons
683	E	Y	R		Y	N	Y	F	B	About coins- different types
684	E	Y	Me		Y	N	Y	F	D	About English History- civil war
685	E	Y	Ma		Y	N	N	F	F	Heaviness of weapons
686	E	Y	N		Y	N	Y	F	D	About weapons; Use of weapons
687	E	Y	H		Y	N	Y	M	D	Visibility
688	E	Y	R		Y	N	Y	F	D	Heaviness of weapons
689	E	Y	H		Y	N	Y	M	D	Visibility
690	N	Y	R		Y	N	Y	F	C	Heaviness of weapons; visibility
691	E	Y			N	N	N	F	C	
692	N	Y	H		Y	N	Y	F	C	Heaviness of weapons
693	E	Y	R		Y	N	Y	M	B	About weapons
694	E	Y	H		Y	N	Y	M	E	About weapons-hand guns slow to load
695	E	Y	R		Y	N	Y	M	C	About weapons-gauntlet weapons uncomfortable
696	E				N	N	Y	F	C	
697	N	Y	H		Y	N	Y	F	C	Heaviness of weapons
698	E	Y	N		Y	N	Y	F	D	Use of weapons; heaviness of weapons
699	E	Y	R		Y	N	Y	F	E	About English history
700	E	N				N	N	F	E	

701	E	Y	R		Y	N	Y	M	C	Use of weapons
702	E	Y	H		Y	N	N	F	D	About weapons-how they feel
703	E	Y	Th		Y	N	Y	M	C	About English history- timeline
704	E	Y	Ma		Y	N	Y-kids	F	E	History in general
705	E	Y			Y	N	Y	F	D	Heaviness of weapons
706	E	Y	Me		Y	N	Y	M	D	Difficulty of fighting and protecting
707	E	Y	H		Y	N	Y	F	E	About weapons-evolution of them
708	N	Y			N	N	N	F	F	
709	E	N			N	N	N	F	F	
710	E	Y	A		Y	N	Y	M	A	About weapons-how they feel
711	E	Y	coins		Y	N	Y-kids	F	E	About coins
712	E	Y	N		Y	N	Y	M	F	Heaviness of weapons; feel of the weapons
713	N	Y	R	crowded	Y	Y-website	Y	M	C	About weapons
714	N	Y	R		Y	N	Y	M	F	
715	E	Y	Ma--Roof		N	Y-At gate	N	M	F	
716	E	Y	R		Y	N	Y	M	A	Use of weapons
717	N	Y	H		Y	Y	Y	F	E	
718	E	Y	R		Y	N	Y	F	E	About weapons; Heaviness of weapons
719	N	Y	R	Me	Y	Y-folder	Y	M	B	Harm in weapons
720	E	Y	H	Me	Y	Y-folder	Y	F	E	Heaviness of weapons; feel of the weapons
721	N	Y				N	Y	M	F	
722	E	Y	coins		Y	N	Y	M	A	About weapons; Use of weapons
723	E	Y	Ma		Y	Y-been before	Y	M	F	History in general
724	E	Y	Me		Y	N	Y	M	B	
725	E	Y	R		Y	N	Y	F	A	Use of weapons
726	E	Y	Th		Y	N	Y	M	F	Heaviness of weapons
727	E	Y	N		Y	N	Y	M	A	Heaviness of weapons
728	E	Y	H		Y	N	Y	F	B	Heaviness of weapons
729	E	Y	Ma		Y	N	Y	M	E	About armor; Use of weapons
730	E	Y	A--Ma		Y	N	Y	F	F	Difficulty of fighting
731	E	Y	R		Y	N	Y	M	F	Perspective
732	E			crowded		N	Y-kids	M	E	
733	E	Y	R	coins	Y	N	Y	F	D	Heaviness of weapons; "Bad archer"
734	E	Y	H		Y	N	Y	M	B	About old and modern weapons; Use of weapons
735	E	Y	Tr		Y	N	Y-kids	F	F	Difficulty of fighting
736	E	Y	R		Y	N	Y-kids	F	F	Heaviness of weapons
737	E	Y	R		Y	N	Y	M	B	
738	N	Y	R		Y	N	N	F	E	Visibility
739	E	Y	Me		Y	N	Y	F	A	Heaviness of weapons
740	E	Y	Tr		Y	N	Y	M	A	Heaviness of weapons
741	E	Y	R		Y	N	Y	M	A	
742	E	Y	R	Me	Y	N	Y	M	E	Heaviness of weapons
743	E	Y			N	N	N	M	E	
744	E	Y	R		Y	N	Y	M	A	About weapons-how they feel
745	E	Y	Tr	crowded	Y	N	Y	F	F	Heaviness of weapons
746	E	Y	Ma		Y	N	Y	M	A	
747	E	Y	H		Y	N	Y	F	A	
748	E	Y			Y	N	Y	M	F	History of weapons
749	E	Y	R		Y	N	Y	F	D	
750	E	Y	H		Y	N	Y	F	D	Heaviness of weapons

751	E	Y	N			N	Y	F	B	
752	E	Y	R		Y	N	Y	M	E	Heaviness of weapons
753	E	Y	Me		Y	N	Y-kids	M	E	Perspective
754	E	Y	R		Y	N	Y	F	A	About weapons and armor
755	N	Y	N	coins	Y	N	N	M	C	
756	E	Y	R		Y	N	Y	F	B	About weapons; Heaviness of weapons
757	E	Y	Tr		Y	N	Y	F	B	Heaviness of weapons
758	N	Y	R		Y	N	N	F	B	Heaviness of weapons; destruction of weapons
759	E	Y	H		Y	N	Y-kids	M	E	Difficulty of drawing a bow
760	E	Y		crowded		N	Y	F	E	
761	E	Y	Me		Y	N	Y	F	E	About armor-how it feels
762	E	Y	H	Th	Y	N	Y-kids	F	F	Heaviness of weapons

Appendix B

					Norman Power		Right on Target		Head Trouble		Medieval Arms		Majestic Might		Aiming High		Trigger Happy		Fire Power		Threat Response	
	Person #	Group	Gender	Age	Time	Action	Time	Action	Time	Action	Time	Action	Time	Action	Time	Action	Time	Action	Time	Action	Time	Action
3/18/2008	1	C	M	20	90		84		36		36		9		16	X	64		0		0	X
3/18/2008	2	B	M	20	28		7		2		0	X	0	X	0	X	0	X	0		7	
3/18/2008	3	E	M	45	86		180		57		86		86		49		42		0		76	
3/18/2008	4	E	M	40	60		287		37		57		0	X	10		0	X	0		89	
3/18/2008	5	D	M	20	80		104		35		84		78		0	X	26		0		45	
3/18/2008	6	F	F	17	30		103		42		57		35		62		23		0		40	
3/18/2008	7	A	M	50	12		75		3		20		8		50		0	X	0		14	
3/18/2008	8	A	M	30	34		22		22		30		24		0	X	61		0		29	
3/18/2008	9	C	F	20	148		15		10		120		10		40		21		0		15	
3/18/2008	10	B	M	30	103		54		32		43		68		40		34		0		34	
3/18/2008	11	B	F	40	7		15		10		10		0	X	11		0	X	0		0	X
3/18/2008	12	B	M	15	27		118		19		7		0	X	0	X	0	X	0		34	X
3/18/2008	13	F	M	5	61		99		98		94		134		47		18		0		90	
3/18/2008	14	B	M	25	0	X	141		0	X	0	X	0	X	0	X	0	X	0		15	
3/19/2008	15	C	M	18	75		55		45		101		0	X	0	X	68		0		0	X
3/19/2008	16	C	F	18	26		0	X	35		23		8		0	X	0	X	0		0	X
3/19/2008	17	A	M	25	0	X	43		6		35		40		14		18		0		16	
3/19/2008	18	D	M	45	35		11		20		25		2		0	X	5		0		2	
3/19/2008	19	D	F	40	0	X	106		31		0	X	0	X	0	X	20		0		6	
3/19/2008	20	F	M	10	53		164		62		42		13		14		41		0		29	
3/19/2008	21	B	M	25	0	X	25		7		0	X	15		0	X	0	X	0		0	X
3/19/2008	22	A	F	20	21		189		26		59		0	X	60		8		0		20	
3/19/2008	23	B	F	30	62		24		36		49		27		40		47		0		17	
3/19/2008	24	E	F	35	76		30		50		0	X	0	X	52		25		0		29	
3/19/2008	25	E	F	35	116		0	X	29		50		77		30		0	X	0		37	
3/19/2008	26	C	M	16	58		94		47		63		30		0	X	3		0		0	X
3/19/2008	27	C	F	16	58		10		28		124		9		5		20		0		86	
3/19/2008	28	E	M	30	36		65		20		69		10		25		13		0		30	
3/19/2008	29	C	F	20	80		158		54		44		27		0	X	0	X	0		0	X
3/19/2008	30	A	M	30	75		83		27		100		15		27		31		0		50	
3/19/2008	31	C	F	16	104		120		73		44		40		45		36		0		162	

3/19/2008	32	B	M	30	45		0	X	0	X	0	X	57		40		24		0		3	
3/19/2008	33	A	M	35	65		102		30		70		80		15		23		0		33	
3/19/2008	34	F	F	15	30		0	X	0	X	0	X	0	X	0	X	0	X	0		0	X
3/19/2008	35	A	F	30	117		150		65		81		48		41		39		0		25	
3/19/2008	36	C	F	30	37		0	X	0	X	10		15		0	X	0	X	0		30	
3/19/2008	37	F	M	5	97		105		40		70		20		53		29		0		28	
3/19/2008	38	C	M	15	18		0	X	15		0	X	0	X	0	X	0	X	0		30	
3/19/2008	39	C	F	30	62		154		31		16		6		0	X	8		0		70	
3/19/2008	40	F	M	7	30		95		26		35		9		100		30		0		0	
3/19/2008	41	A	F	15	0		15		8		10		0		5		0		0		5	
3/19/2008	42	B	F	25	17		53		0		38		21		19		38		0		12	
3/19/2008	43	B	M	65	10		0	X	0	X	0	X	0	X	16		0		0		11	
3/19/2008	44	E	M	50	49		54		0	X	46		15		0	X	23		0		0	
3/19/2008	45	F	F	10	48		32		24		70		34		0		0	X	0		13	
3/19/2008	46	C	F	45	10		32		0		0	X	25		85		0	X	0		0	X
3/19/2008	47	D	F	40	114		62		20		0	X	0	X	0	X	0	X	0		0	X
3/19/2008	48	B	F	16	30		127		21		67		38		11		0	X	0		100	
3/19/2008	49	F	F	5	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0		0	X
3/19/2008	50	C	M	20	83		180		43		65		85		53		10		0		71	
3/19/2008	51	B	M	30	25		152		0	X	0	X	0	X	0	X	0		0		0	
3/19/2008	52	F	M	10	5		68		17		9		35		83		17		0		9	
3/19/2008	53	F	F	15	63		9		25		125		0		0		15		0		70	
3/19/2008	54	C	M	45	32		35		0		0		0	X	0	X	0	X	0		12	
3/19/2008	55	F	M	16	53		175		45		0		0		105		15		0		39	
3/19/2008	56	C	F	30	53		47		8		0	X	13		30		14		0		13	
3/20/2008	57	C	F	16	13		21		24		22		23		17		0	X	6		17	
3/20/2008	58	D	F	45	85		163		28		86		44		7		25		2		0	X
3/20/2008	59	A	M	35	11		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/20/2008	60	C	M	18	11		6		0	X	0	X	12		0	X	8		0	X	0	X

3/20/2008	61	B	F	25	28		0	X	15		7		22		4		23		10		3	
3/20/2008	62	B	M	30	14		40		34		10		10		21		13		37		9	
3/20/2008	63	C	F	18	69		45		26		43		110		25		40		24		62	
3/20/2008	64	D	M	40	75		135		57		100		127		3		31		0	X	50	
3/20/2008	65	F	F	12	35		111		34		40		23		15		0	X	5		0	X
3/20/2008	66	C	F	20	15		71		0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/20/2008	67	D	F	40	41		165		45		22		37		14		0	X	3		0	X
3/20/2008	68	B	F	20	40		35		23		108		0	X	0	X	0	X	0	X	5	
3/20/2008	69	C	M	25	42		131		45		47		40		0	X	20		0	X	0	X
3/20/2008	70	B	F	30	5		31		32		20		0	X	30		0	X	0	X	0	X
3/20/2008	71	C	F	15	0	X	0	X	16		70		15		25		17		0	X	0	X
3/20/2008	72	D	M	50	87		180		34		138		73		51		66		36		44	
3/20/2008	73	C	F	15	60		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/20/2008	74	D	F	40	0	X	9		5		0	X	0		0		42		0	X	0	X
3/20/2008	75	B	F	18	20		15		0		12		5		25		0		0		6	
3/20/2008	76	C	F	15	40		60		22		0	X	11		19		53		0	X	0	X
3/20/2008	77	D	F	40	43		32		38		28		57		35		17		15		67	
3/20/2008	78	B	M	55	8		7		7		30		0		0	X	0	X	0	X	0	
3/20/2008	79	B	M	28	12		44		36		20		7		18		19		35		17	
3/20/2008	80	G	F	7	5		0	X	25		48		28		130		0	X	0	X	40	
3/20/2008	81	C	F	35	85		88		2		65		33		5		41		51		55	
3/20/2008	82	F	M	7	129		0	X	0	X	0	X	50		164		65		78		210	
3/25/2008	83	B	M	40	20		61		30		18		6		16		0	X	0	X	0	X
3/25/2008	84	E	F	40	99		57		19		0	X	0	X	7		0	X	0	X	4	
3/25/2008	85	B	F	35	56		57		30		55		25		66		31		0	X	28	
3/25/2008	86	C	F	20	54		64		37		17		123		0	X	34		11		14	
3/25/2008	87	C	M	16	91		74		53		100		90		46		22		13		45	
3/25/2008	88	E	M	45	43		85		56		125		6		46		35		4		33	
3/25/2008	89	F	F	18	74		81		8		114		16		7		0	X	0	X	8	
3/25/2008	90	B	M	25	30		140		34		46		0	X	0	X	0	X	0	X	0	X

3/25/2008	91	D	M	55	95		189		22		69		74		50		60		0	X	20	
3/25/2008	92	D	F	40	60		26		104		56		68		41		22		43		67	
3/25/2008	93	A	M	30	27		0	X	55		0	X	10		0	X	14		3		20	
3/25/2008	94	D	M	35	36		50		0	X	10		0	X	0	X	37		11		45	
3/25/2008	95	B	M	20	25		55		36		22		10		50		9		12		24	
3/25/2008	96	B	M	35	86		72		45		60		50		75		71		49		19	
3/25/2008	97	C	M	15	180		85		30		25		21		0	X	8		0	X	12	
3/25/2008	98	F	F	16	34		100		31		59		41		48		27		6		10	
3/25/2008	99	D	M	45	83		43		65		49		19		86		50		29		63	
3/25/2008	100	C	F	20	125		89		45		120		150		70		30		11		114	
3/25/2008	101	D	F	35	54		209		49		114		56		0	X	33		34		93	
3/25/2008	102	D	M	30	36		54		27		13		10		20		0	X	0	X	5	
3/25/2008	103	E	M	45	30		38		55		70		9		0	X	0	X	0	X	0	X
3/25/2008	104	B	M	25	57		28		33		65		110		37		41		20		35	
3/25/2008	105	F	M	14	0	X	143		40		70		30		70		0	X	8		24	
3/25/2008	106	E	F	45	140		136		51		55		25		60		20		35		56	
3/25/2008	107	A	M	30	120		80		36		62		77		52		27		16		44	
3/25/2008	108	B	F	40	35		79		14		22		9		39		30		3		110	
3/25/2008	109	F	M	5	53		75		16		60		62		77		62		17		0	
3/25/2008	110	C	F	15	84		84		55		144		46		55		30		12		37	
3/25/2008	111	B	F	16	42		0	X	18		10		20		23		10		9		5	
3/25/2008	112	E	M	45	142		195		25		25		13		55		16		2		25	
3/25/2008	113	F	F	10	134		262		40		129		70		54		2		0	X	6	
3/25/2008	114	F	M	12	146		132		46		224		19		67		38		0	X	2	
3/25/2008	115	E	M	5	114		150		74		70		22		58		34		20		19	
3/25/2008	116	B	F	35	57		32		16		9		32		7		45		5		4	
3/25/2008	117	G	M	5	129		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/25/2008	118	F	M	5	84		106		99		78		60		61		45		36		22	
3/25/2008	119	E	F	40	90		183		18		44		46		25		18		6		14	
3/25/2008	120	F	M	18	2		0	X	18		0	X	2		48		11		2		6	
3/25/2008	121	H	M	55	13		90		47		103		2		2		0	X	0	X	0	X
3/25/2008	122	B	M	35	12		9		35		109		2		52		2		2		2	

3/25/2008	123	F	M	10	86		103		17		126		48		60		36		40		75	
3/25/2008	124	C	F	25	74		O	X	O	X	9		2		2		2		8		5	
3/25/2008	125	C	M	16	45		201		29		55		5		9		36		5		23	
3/25/2008	126	B	F	55	10		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/25/2008	127	B	F	35	11		24		30		39		21		2		12		7		5	
3/25/2008	128	D	M	45	80		95		40		100		164		90		0	X	2		66	
3/25/2008	129	F	M	5	21		79		37		8		20		105		16		0	X	50	
3/25/2008	130	B	M	60	10		127		0	X	25		2		2		2		25		0	X
3/25/2008	131	C	M	15	113		0	X	23		0	X	0	X	67		5		0	X	0	X
3/25/2008	132	D	F	45	5		99		17		30		64		21		13		20		7	
3/25/2008	133	C	F	70	2		2		0	X	0	X	2		0	X	2		0	X	2	
3/26/2004	134	B	M	30	22		22		27		21		17		2		15		0	X	3	
3/26/2004	135	C	F	20	66		19		22		30		60		12		0	X	0	X	9	
3/26/2004	136	B	M	40	30		26		0	X	34		10		39		0	X	0	X	0	X
3/26/2004	137	F	M	15	17		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/26/2004	138	E	M	20	50		10		0	X	0	X	0	X	0	X	0	X	0	X	0	X
3/26/2004	139	F	M	5	110		254		0	X	129		25		70		0	X	15		0	X
3/26/2004	140	B	F	30	0	X	10		0	X	58		10		2		2		2		1	
3/26/2004	141	F	F	7	133		0	X	0	X	0	X	10		67		21		15		0	X
3/26/2004	142	F	F	20	6		23		16		16		56		0	X	18		0	X	28	
3/26/2004	143	C	M	35	41		53		60		5		26		25		21		0	X	26	
3/26/2004	144	B	F	30	58		68		62		74		0	X	3		25		0	X	15	
3/26/2004	145	E	M	55	91		151		53		140		51		48		60		22		75	
3/26/2004	146	C	M	18	56		103		25		41		0	X	0	X	54		41		0	X
3/26/2004	147	F	M	7	64		62		20		47		9		51		23		8		104	
3/26/2004	148	B	F	25	0	X	8		15		17		6		2		0	X	0	X	0	X
3/26/2004	149	B	F	30	23		92		44		14		22		45		26		17		30	
3/26/2004	150	E	F	35	65		17		12		30		0	X	0	X	0	X	0	X	0	X
3/26/2004	151	H	F	30	123		242		94		50		70		60		30		5		52	
3/26/2004	152	C	F	20	4		5		54		24		7		28		48		6		4	
3/26/2004	153	F	M	7	97		310		50		87		25		80		30		55		30	
3/26/2004	154	E	M	70	5		115		51		62		130		45		45		0	X	28	
3/26/2004	155	A	M	40	42		14		39		74		19		32		0	X	16		29	
3/26/2004	156	F	M	4	90		128		84		104		21		136		25		5		85	
3/26/2004	157	C	F	16	56		209		57		64		8		45		11		3		0	X
3/26/2004	158	F	M	15	0	X	0	X	0	X	0	X	5		43		38		0	X	2	
3/26/2004	159	F	M	7	140		345		38		66		25		0	X	30		0	X	40	
3/26/2004	160	C	F	65	44		28		18		45		60		18		7		9		55	

3/28/2008	161	C	F	20	109		47		48		44		47		30		22		0	X	38	
3/28/2008	162	C	F	30	0	X	0	X	3		0	X	0	X	0	X	0	X	0	X	0	X
3/28/2008	163	D	F	40	0	X	0	X	0	X	40		0	X	0	X	0	X	0	X	0	X
3/28/2008	164	C	F	20	57		119		31		14		0	X	8		25		0	X	20	
3/28/2008	165	A	M	34	67		120		47		93		25		32		24		38		7	
3/28/2008	166	F	F	12	8		0	X	30		55		0	X	27		0	X	0	X	5	
3/28/2008	167	C	F	20	75		10		34		37		56		53		44		0	X	9	
3/28/2008	168	B	M	25	70		50		23		70		103		8		62		28		120	
3/28/2008	169	D	F	55	13		37		14		7		29		36		8		30		8	
3/28/2008	170	C	F	15	43		0	X	0	X	59		30		22		15		0	X	0	X
3/28/2008	171	D	F	35	2		12		5		29		0	X	0	X	5		12		4	
3/28/2008	172	C	M	15	5		50		35		39		6		39		17		16		13	
3/28/2008	173	F	M	4	105		45		0	X	0	X	0	X	0	X	0	X	0	X	5	
3/28/2008	174	C	M	30	69		120		51		91		27		25		37		38		6	
3/28/2008	175	C	M	16	36		113		39		70		36		15		9		3		37	
3/28/2008	176	A	F	25	51		45		12		0	X	44		7		0	X	0	X	0	X
3/28/2008	177	F	F	5	64		130		58		65		12		87		11		8		21	
3/28/2008	178	B	F	70	5		4		22		48		15		34		9		4		4	
3/28/2008	179	C	M	18	36		64		37		13		115		15		15		0	X	14	
3/28/2008	180	G	F	12	40		205		38		66		0	X	51		18		5		58	
3/28/2008	181	A	M	30	8		24		28		30		72		24		15		24		36	
3/28/2008	182	E	M	45	14		45		90		115		0	X	65		30		20		10	
3/28/2008	183	A	M	55	23		9		115		124		45		53		49		56		33	
3/28/2008	184	C	F	15	31		116		9		0	X	0	X	3		11		9		20	
3/31/2008	185	F	M	5	61		69		33		63		6		68		13		42		25	
3/31/2008	186	C	M	15	80		50		40		10		26		50		35		10		33	
3/31/2008	187	G	F	15	68		84		32		43		0	X	38		13		0	X	0	X
3/31/2008	188	F	M	5	12		79		27		0	X	25		0	X	26		40		25	
3/31/2008	189	B	F	40	96		15		39		5		150		17		20		30		15	
3/31/2008	190	C	F	10	42		215		15		74		10		30		15		5		37	
3/31/2008	191	E	M	50	9		16		29		19		117		5		5		11		8	
3/31/2008	192	F	M	5	120		56		114		43		0	X	107		19		9		82	
3/31/2008	193	F	F	5	55		155		34		0	X	0	X	0	X	0	X	0	X	136	
3/31/2008	194	C	F	15	40		100		97		125		14		48		38		0	X	33	
3/31/2008	195	A	F	50	71		21		43		55		95		9		25		37		25	

3/31/2008	196	F	M	5	86		142		60		87		120		50		25		4		110	
3/31/2008	197	F	M	10	191		0	X	23		10		1		1		1		0	X	70	
3/31/2008	198	B	M	25	70		30		43		60		18		30		48		5		11	
3/31/2008	199	C	M	28	15		75		11		0	X	19		5		23		0	X	28	
3/31/2008	200	C	F	16	80		234		39		0	X	5		0	X	0	X	0	X	0	X
3/31/2008	201	F	F	21	66		105		33		75		26		34		21		10		66	
3/31/2008	202	C	F	30	60		72		57		132		10		0	X	0	X	0	X	33	
3/31/2008	203	B	F	30	96		93		45		133		75		10		60		20		30	
3/31/2008	204	E	M	45	125		190		53		24		12		121		17		40		76	
3/31/2008	205	C	F	15	18		245		6		52		0	X	26		24		18		266	
4/1/2008	206	B	F	28	65		72		24		28		144		40		30		69		32	
4/1/2008	207	F	F	15	0	X	80		40		30		0	X	92		14		0	X	5	
4/1/2008	208	A	M	30	50		61		36		55		90		50		30		36		76	
4/1/2008	209	C	F	25	65		130		0	X	8		7		15		0	X	0	X	5	
4/1/2008	210	F	F	5	65		22		47		45		35		55		50		0	X	110	
4/1/2008	211	C	F	15	0	X	65		30		55		15		0	X	0	X	0	X	0	X
4/1/2008	212	C	F	18	70		6		40		77		78		27		14		4		35	
4/1/2008	213	F	F	5	80		45		50		17		52		7		0	X	8		9	
4/1/2008	214	F	M	5	92		80		45		12		0	X	65		0	X	23		20	
4/1/2008	215	C	M	20	70		94		60		60		0	X	0	X	40		20		30	
4/1/2008	216	C	M	15	107		126		122		128		120		70		21		44		115	
4/1/2008	217	G	M	10	15		130		25		125		15		50		30		0	X	0	X
4/1/2008	218	B	F	25	3		10		26		4		4		4		20		0	X	16	
4/1/2008	219	E	M	60	100		38		50		100		48		37		160		18		15	
4/1/2008	220	C	M	15	55		190		44		70		126		105		0	X	30		113	
4/1/2008	221	C	M	50	35		108		8		24		95		5		33		40		27	
4/1/2008	222	F	F	5	140		120		20		150		26		50		55		20		90	
4/1/2008	223	B	M	30	27		18		19		25		4		8		24		5		0	X
4/1/2008	224	B	M	30	18		52		23		7		60		7		26		43		5	
4/1/2008	225	B	F	25	17		5		4		38		10		0	X	5		5		2	
4/1/2008	226	C	M	45	65		65		55		60		30		22		20		20		45	
4/2/2008	227	B	M	45	3		35		3		3		0	X	0	X	7		0	X	0	X
4/2/2008	228	C	M	15	80		25		15		0	X	0	X	0	X	0	X	26		26	
4/2/2008	229	A	M	18	113		150		23		23		0	X	0	X	0	X	10		10	
4/2/2008	230	G	M	10	30		147		130		20		0	X	130		20		0	X	12	
4/2/2008	231	A	M	40	13		19		24		25		13		3		20		15		15	
4/2/2008	232	C	F	25	55		145		55		100		30		30		45		45		25	

4/2/2008	233	D	F	40	63		100		20		65		20		50		64		30		126	
4/2/2008	234	F	M	18	40		130		70		60		0	X	4		8		3		20	
4/2/2008	235	B	F	65	2		5		0	X	8		0	X	30		10		0	X	5	
4/2/2008	236	E	M	50	80		78		45		77		110		5		30		40		20	
4/2/2008	237	G	M	10	55		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/2/2008	238	E	F	35	90		90		4		10		3		65		28		18		60	
4/2/2008	239	B	M	55	30		16		17		30		25		0	X	25		0	X	22	
4/2/2008	240	C	F	15	32		90		33		44		0	X	46		40		0	X	7	
4/2/2008	241	C	F	20	35		290		65		10		0	X	0	X	11		5		24	
4/2/2008	242	E	M	35	15		5		15		0	X	5		60		40		18		60	
4/2/2008	243	E	F	40	5		5		8		5		15		5		23		38		45	
4/2/2008	244	C	M	18	115		100		26		43		55		17		0	X	0	X	0	
4/2/2008	245	B	M	20	4		10		41		12		35		37		0	X	0	X	0	X
4/2/2008	246	F	F	15	165		165		60		150		120		0	X	80		5		90	
4/2/2008	247	F	M	20	60		0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/2/2008	248	F	M	10	98		110		16		102		95		35		20		0	X	70	
4/2/2008	249	A	M	30	20		0	X	15		50		0	X	12		0	X	0	X	4	
4/2/2008	250	A	F	35	4		3		15		15		0	X	6		5		0	X	0	X
4/2/2008	251	F	F	5	60		270		100		205		70		20		8		45		90	
4/2/2008	252	B	M	65	5		3		0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/2/2008	253	F	M	15	70		45		0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/7/2008	254	D	M	70	15		25		0	X	0	X	5		0	X	45		7		0	X
4/7/2008	255	F	M	5	61		10		5		130		18		0	X	10		47		10	
4/7/2008	256	F	F	5	60		75		25		75		0	X	0	X	12		9		30	
4/7/2008	257	E	M	70	0	X	104		7		12		0	X	0	X	6		6		0	X
4/7/2008	258	B	F	60	9		49		39		41		5		61		0	X	5		7	
4/7/2008	259	G	M	10	26		140		96		19		0	X	47		36		0	X	35	
4/7/2008	260	F	M	8	0	X	99		20		65		0	X	0	X	0	X	0	X	6	
4/7/2008	261	F	M	8	168		168		77		0	X	25		84		0	X	0	X	0	X
4/7/2008	262	E	F	65	0	X	110		13		0	X	29		3		3		6		13	
4/7/2008	263	F	F	10	207		144		0	X	20		0	X	0	X	0	X	0	X	0	X
4/7/2008	264	F	F	14	64		85		58		79		92		81		19		0	X	107	
4/7/2008	265	D	F	40	25		110		33		75		0	X	0	X	0	X	9		0	X
4/9/2008	266	C	F	27	32		8		48		5		30		24		8		0	X	5	
4/9/2008	267	F	M	10	65		185		15		10		10		0	X	38		0	X	0	X

4/9/2008	268	C	M	65	24		37		27		26		0	X	3		0	X	0	X	8	
4/9/2008	269	C	M	50	0	X	0	X	0	X	0	X	0	X	15		24		24		18	
4/9/2008	270	C	F	40	2		2		7		28		5		0	X	20		0	X	22	
4/9/2008	271	C	M	12	90		91		39		55		17		19		43		0	X	0	X
4/9/2008	272	C	M	55	5		5		5		20		60		7		16		16		0	X
4/9/2008	273	F	M	6	47		133		47		64		0	X	110		30		0	X	14	
4/9/2008	274	E	F	40	15		62		51		71		4		6		0	X	0	X	18	
4/9/2008	275	B	M	40	0	X	119		60		22		0	X	0	X	0	X	0	X	0	X
4/9/2008	276	B	M	60	60		78		30		61		35		32		28		15		52	
4/9/2008	277	A	M	40	11		6		9		5		7		0	X	14		0	X	4	
4/9/2008	278	C	M	60	2		5		3		10		3		0	X	2		0	X	2	
4/9/2008	279	C	F	15	42		8		4		3		12		28		40		0	X	70	
4/9/2008	280	C	M	60	30		5		39		25		20		5		0	X	0	X	20	
4/9/2008	281	C	M	65	41		38		20		64		51		29		11		0	X	0	X
4/9/2008	282	A	M	60	17		20		18		18		26		18		23		15		30	
4/9/2008	283	D	M	45	3		50		30		70		7		5		4		0	X	10	
4/10/2008	284	F	M	3	8		0	X	39		75		58		95		75		19		15	
4/10/2008	285	F	F	5	10		142		0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/10/2008	286	C	M	40	4		43		46		15		0	X	7		7		4		10	
4/10/2008	287	E	F	55	56		76		26		128		10		30		15		56		160	
4/10/2008	288	C	M	15	50		133		52		57		0	X	75		21		5		8	
4/10/2008	289	D	F	75	45		80		38		42		31		20		42		5		8	
4/10/2008	290	G	F	7	2		33		0	X	0	X	0	X	0	X	0	X	0	X	0	X
4/10/2008	291	B	F	5	13		64		55		4		0	X	8		21		5		0	
4/10/2008	292	F	M	3	0	X	0	X	55		162		6		101		25		17		121	
4/10/2008	293	F	M	8	49		182		35		66		108		78		25		5		119	
4/10/2008	294	F	M	7	42		102		77		0	X	0	X	64		31		19		10	
4/10/2008	295	D	M	60	26		60		0	X	65		7		0	X	4		0	X	0	X
4/10/2008	296	B	M	50	0	X	29		54		13		31		7		11		17		51	
4/10/2008	297	B	F	40	6		3		33		10		3		3		3		5		12	
4/10/2008	298	A	M	40	12		20		0	X	8		41		4		25		12		64	
4/10/2008	299	F	M	8	58		77		22		0	X	0	X	0	X	0	X	0	X	0	X
4/10/2008	300	A	F	60	54		120		31		0	X	7		30		13		0	X	31	

Appendix C

SURVEY

1. **Age:** Under10 11-17 18-25 26-35 36-49 50+

2. **Gender** Male Female Other

3. **Language** Is English your preferred language? Other _____

4. What was your favorite exhibit?

5. What there an exhibit you didn't like?

6. Do you feel you have learned something from this exhibit?

7. Is there something specific?

8. Did you know about Hands-On-History before you entered the room?
   Was it what you expected?

Appendix D

Age:	Under 10	11-17	18-25	26-35	36-49	50+
Gender:	Male	Female				
Language:	English		Other:			
Favorite Exhibit:						
Didn't Like:						
Learned anything?		Yes		No		
More specifically:						
Know about HOH		Yes		No		
Meet expectations		Yes		No		

Age:	Under 10	11-17	18-25	26-35	36-49	50+
Gender:	Male	Female				
Language:	English		Other:			
Favorite Exhibit:						
Didn't Like:						
Learned anything?		Yes		No		
More specifically:						
Know about HOH		Yes		No		
Meet expectations		Yes		No		

Age:	Under 10	11-17	18-25	26-35	36-49	50+
Gender:	Male	Female				
Language:	English		Other:			
Favorite Exhibit:						
Didn't Like:						
Learned anything?		Yes		No		
More specifically:						
Know about HOH		Yes		No		
Meet expectations		Yes		No		

Appendix E

SURVEY

1. Is **English** your preferred **Language**?
2. Did you **enjoy** the exhibit?
3. What was your **favorite** display?
4. Was there a display you **did not like**?
5. Do you feel you have **learned** something?
6. Can you **share** an **example** of something you have **learned**?
7. Did you **know** there were **hands-on displays *before*** you entered this Tower?
8. Would you **like** to see **more interactive** displays in the rest of the Tower?
9. Age:

Under10 11-17 18-25 26-35 36-49 50+

Appendix F

Language:	English			Other:		
Enjoy exhibit	Yes			No		
Favorite Display:						
Didn't Like:						
Learned anything?	Yes			No		
Example of something learned:						
Know about HOH	Yes			No		
More interactivity:	Yes			No		
Gender:	Male			Female		
Age:	10+U	11-17	18-25	26-35	36-49	50+

Language:	English			Other:		
Enjoy exhibit	Yes			No		
Favorite Display:						
Didn't Like:						
Learned anything?	Yes			No		
Example of something learned:						
Know about HOH	Yes			No		
More interactivity:	Yes			No		
Gender:	Male			Female		
Age:	10+U	11-17	18-25	26-35	36-49	50+

Language:	English			Other:		
Enjoy exhibit	Yes			No		
Favorite Display:						
Didn't Like:						
Learned anything?	Yes			No		
Example of something learned:						
Know about HOH	Yes			No		
More interactivity:	Yes			No		
Gender:	Male			Female		
Age:	10+U	11-17	18-25	26-35	36-49	50+

Appendix G

Group Type:(circle) Person (alone) Single Parent (w/ child) Child (part of family) Teacher (in school group)
Person (in a couple) Parent (w/ spouse & child) Child (in school group)

Exhibit	Norman Power	Right on Target	Heading for Trouble	Medieval Arms Race	Majestic Might	Aiming High	Trigger Happy	Threat & Response
	(1075)	(1190)	(1300)	(1381)	(1520)	(1640)	(1660)	(1916)
Read label								
Comment or ask question								
Manipulate or interact								
Watch others interact								
Ignore exhibit								
Time spent								

Group Type:(circle) Person (alone) Single Parent (w/ child) Child (part of family) Teacher (in school group)
Person (in a couple) Parent (w/ spouse & child) Child (in school group)

Exhibit	Norman Power	Right on Target	Heading for Trouble	Medieval Arms Race	Majestic Might	Aiming High	Trigger Happy	Threat & Response
	(1075)	(1190)	(1300)	(1381)	(1520)	(1640)	(1660)	(1916)
Read label								
Comment or ask question								
Manipulate or interact								
Watch others interact								
Ignore exhibit								
Time Spent								

Group Type:(circle) Person (alone) Single Parent (w/ child) Child (part of family) Teacher (in school group)
Person (in a couple) Parent (w/ spouse & child) Child (in school group)

Exhibit	Norman Power	Right on Target	Heading for Trouble	Medieval Arms Race	Majestic Might	Aiming High	Trigger Happy	Threat & Response
	(1075)	(1190)	(1300)	(1381)	(1520)	(1640)	(1660)	(1916)
Read label								
Comment or ask question								
Manipulate or interact								
Watch others interact								
Ignore exhibit								
Time spent								

Appendix H

Group Type:(circle) Person (alone) Person (in a couple) Person (friends group) Single Parent (w/ child) Parent (w/ spouse & child) Child (part of family) Teacher (in school group) Child (in school group)

Exhibit	Norm. Power	R. on Target	Head for Trouble	Med. Arms Race	Majestic Might	Aiming High	Trig. Happy	Fire Power	Threat & Resp.
	1--(1075)	2--(1190)	3--(1300)	4--(1381)	5--(1520)	6--(1640)	7--(1660)	8--(1710)	9--(1916)
Read label									
Comment on exhibit									
Manipulate or interact									
Watch others interact									
Only Observed Exhibit									
Ignore exhibit									
Time spent									

Group Type:

Exhibit	Norm. Power	R. on Target	Head for Trouble	Med. Arms Race	Majestic Might	Aiming High	Trig. Happy	Fire Power	Threat & Resp.
	1--(1075)	2--(1190)	3--(1300)	4--(1381)	5--(1520)	6--(1640)	7--(1660)	8--(1710)	9--(1916)
Read label									
Comment on exhibit									
Manipulate or interact									
Watch others interact									
Only Observed Exhibit									
Ignore exhibit									
Time spent									

Group Type:

Exhibit	Norm. Power	R. on Target	Head for Trouble	Med. Arms Race	Majestic Might	Aiming High	Trig. Happy	Fire Power	Threat & Resp.
	1--(1075)	2--(1190)	3--(1300)	4--(1381)	5--(1520)	6--(1640)	7--(1660)	8--(1710)	9--(1916)
Read label									
Comment on exhibit									
Manipulate or interact									
Watch others interact									
Only Observed Exhibit									
Ignore exhibit									
Time spent									

Appendix I

Date:

Start Time	End Time	Length of Time	# of visitors

Appendix J

March 26, 2008

IN & OUT

Start Time	End Time	# of visitors	Total
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	1	
9:50 AM	10:00 AM	0	1
10:00 AM	10:10 AM	0	
10:10 AM	10:20 AM	2	
10:20 AM	10:30 AM	1	3
10:30 AM	10:40 AM	2	
10:40 AM	10:50 AM	5	
10:50 AM	11:00 AM	5	12
11:00 AM	11:10 AM	13	
11:10 AM	11:20 AM	23	
11:20 AM	11:30 AM	15	51
11:30 AM	11:40 AM	4	
11:40 AM	11:50 AM	14	
11:50 AM	12:00 PM	5	23
12:00 PM	12:10 PM	30	
12:10 PM	12:20 PM	36	
12:20 PM	12:30 PM	4	70
12:30 PM	12:40 PM	14	
12:40 PM	12:50 PM	12	
12:50 PM	1:00 PM	21	47
1:00 PM	1:10 PM	23	
1:10 PM	1:20 PM	12	
1:20 PM	1:30 PM	6	41
1:30 PM	1:40 PM	32	
1:40 PM	1:50 PM	6	
1:50 PM	2:00 PM	12	50
2:00 PM	2:10 PM	6	
2:10 PM	2:20 PM	20	
2:20 PM	2:30 PM	4	30
2:30 PM	2:40 PM	14	
2:40 PM	2:50 PM	4	
2:50 PM	3:00 PM	5	23
3:00 PM	3:10 PM	4	
3:10 PM	3:20 PM	15	
3:20 PM	3:30 PM	15	34
3:30 PM	3:40 PM	15	
3:40 PM	3:50 PM	9	
3:50 PM	4:00 PM	9	33
4:00 PM	4:10 PM	14	
4:10 PM	4:20 PM	16	
4:20 PM	4:30 PM	17	47
4:30 PM	4:40 PM	20	
4:40 PM	4:50 PM	18	
4:50 PM	5:00 PM	19	57
Total			522

HOH

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	22	
9:50 AM	10:00 AM	15	37
10:00 AM	10:10 AM	40	
10:10 AM	10:20 AM	6	
10:20 AM	10:30 AM	49	95
10:30 AM	10:40 AM	93	
10:40 AM	10:50 AM	84	
10:50 AM	11:00 AM	62	239
11:00 AM	11:10 AM	78	
11:10 AM	11:20 AM	123	
11:20 AM	11:30 AM	120	321
11:30 AM	11:40 AM	91	
11:40 AM	11:50 AM	185	
11:50 AM	12:00 PM	139	415
12:00 PM	12:10 PM	155	
12:10 PM	12:20 PM	136	
12:20 PM	12:30 PM	129	420
12:30 PM	12:40 PM	147	
12:40 PM	12:50 PM	126	
12:50 PM	1:00 PM	169	442
1:00 PM	1:10 PM	194	
1:10 PM	1:20 PM	130	
1:20 PM	1:30 PM	125	449
1:30 PM	1:40 PM	168	
1:40 PM	1:50 PM	105	
1:50 PM	2:00 PM	108	381
2:00 PM	2:10 PM	139	
2:10 PM	2:20 PM	162	
2:20 PM	2:30 PM	137	438
2:30 PM	2:40 PM	128	
2:40 PM	2:50 PM	121	
2:50 PM	3:00 PM	114	363
3:00 PM	3:10 PM	115	
3:10 PM	3:20 PM	204	
3:20 PM	3:30 PM	154	473
3:30 PM	3:40 PM	178	
3:40 PM	3:50 PM	98	
3:50 PM	4:00 PM	122	398
4:00 PM	4:10 PM	131	
4:10 PM	4:20 PM	156	
4:20 PM	4:30 PM	110	397
4:30 PM	4:40 PM	105	
4:40 PM	4:50 PM	118	
4:50 PM	5:00 PM	195	418
Total			5286

WHITE TOWER

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	71	
9:40 AM	9:50 AM	16	
9:50 AM	10:00 AM	1	88
10:00 AM	10:10 AM	113	
10:10 AM	10:20 AM	41	
10:20 AM	10:30 AM	73	227
10:30 AM	10:40 AM	55	
10:40 AM	10:50 AM	62	
10:50 AM	11:00 AM	174	291
11:00 AM	11:10 AM	174	
11:10 AM	11:20 AM	177	
11:20 AM	11:30 AM	118	469
11:30 AM	11:40 AM	165	
11:40 AM	11:50 AM	164	
11:50 AM	12:00 PM	193	522
12:00 PM	12:10 PM	123	
12:10 PM	12:20 PM	202	
12:20 PM	12:30 PM	201	526
12:30 PM	12:40 PM	235	
12:40 PM	12:50 PM	226	
12:50 PM	1:00 PM	199	660
1:00 PM	1:10 PM	102	
1:10 PM	1:20 PM	149	
1:20 PM	1:30 PM	131	382
1:30 PM	1:40 PM	169	
1:40 PM	1:50 PM	173	
1:50 PM	2:00 PM	183	525
2:00 PM	2:10 PM	200	
2:10 PM	2:20 PM	112	
2:20 PM	2:30 PM	112	424
2:30 PM	2:40 PM	145	
2:40 PM	2:50 PM	171	
2:50 PM	3:00 PM	200	516
3:00 PM	3:10 PM	177	
3:10 PM	3:20 PM	177	
3:20 PM	3:30 PM	133	487
3:30 PM	3:40 PM	123	
3:40 PM	3:50 PM	181	
3:50 PM	4:00 PM	148	452
4:00 PM	4:10 PM	109	
4:10 PM	4:20 PM	146	
4:20 PM	4:30 PM	93	348
4:30 PM	4:40 PM	147	
4:40 PM	4:50 PM	112	
4:50 PM	5:00 PM	84	343
Total			6260
5:00 PM	5:10 PM	45	
5:10 PM	5:20 PM	32	
5:20 PM	5:30 PM	8	85
Total			6345

Total Number of People Entering the Tower of London: 8,733

April 4, 2008

In & Out

Start Time	End Time	# of visitors	Total
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	0	
9:50 AM	10:00 AM	3	3
10:00 AM	10:10 AM	0	
10:10 AM	10:20 AM	2	
10:20 AM	10:30 AM	0	2
10:30 AM	10:40 AM	0	
10:40 AM	10:50 AM	0	
10:50 AM	11:00 AM	0	0
11:00 AM	11:10 AM	0	
11:10 AM	11:20 AM	5	
11:20 AM	11:30 AM	15	20
11:30 AM	11:40 AM	25	
11:40 AM	11:50 AM	7	
11:50 AM	12:00 PM	18	50
12:00 PM	12:10 PM	0	
12:10 PM	12:20 PM	2	
12:20 PM	12:30 PM	2	4
12:30 PM	12:40 PM	8	
12:40 PM	12:50 PM	10	
12:50 PM	1:00 PM	12	30
1:00 PM	1:10 PM	8	
1:10 PM	1:20 PM	7	
1:20 PM	1:30 PM	8	23
1:30 PM	1:40 PM	20	
1:40 PM	1:50 PM	5	
1:50 PM	2:00 PM	8	33
2:00 PM	2:10 PM	7	
2:10 PM	2:20 PM	10	
2:20 PM	2:30 PM	8	25
2:30 PM	2:40 PM	9	
2:40 PM	2:50 PM	8	
2:50 PM	3:00 PM	22	39
3:00 PM	3:10 PM	1	
3:10 PM	3:20 PM	2	
3:20 PM	3:30 PM	11	14
3:30 PM	3:40 PM	9	
3:40 PM	3:50 PM	15	
3:50 PM	4:00 PM	11	35
4:00 PM	4:10 PM	33	
4:10 PM	4:20 PM	14	
4:20 PM	4:30 PM	8	55
4:30 PM	4:40 PM	23	
4:40 PM	4:50 PM	10	
4:50 PM	5:00 PM	7	40
Total			373

HOH

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	0	
9:50 AM	10:00 AM	3	3
10:00 AM	10:10 AM	0	
10:10 AM	10:20 AM	20	
10:20 AM	10:30 AM	40	60
10:30 AM	10:40 AM	34	
10:40 AM	10:50 AM	33	
10:50 AM	11:00 AM	36	103
11:00 AM	11:10 AM	31	
11:10 AM	11:20 AM	63	
11:20 AM	11:30 AM	89	183
11:30 AM	11:40 AM	159	
11:40 AM	11:50 AM	63	
11:50 AM	12:00 PM	76	298
12:00 PM	12:10 PM	44	
12:10 PM	12:20 PM	84	
12:20 PM	12:30 PM	124	252
12:30 PM	12:40 PM	102	
12:40 PM	12:50 PM	127	
12:50 PM	1:00 PM	63	292
1:00 PM	1:10 PM	94	
1:10 PM	1:20 PM	101	
1:20 PM	1:30 PM	104	299
1:30 PM	1:40 PM	130	
1:40 PM	1:50 PM	100	
1:50 PM	2:00 PM	105	335
2:00 PM	2:10 PM	106	
2:10 PM	2:20 PM	102	
2:20 PM	2:30 PM	91	299
2:30 PM	2:40 PM	85	
2:40 PM	2:50 PM	95	
2:50 PM	3:00 PM	120	300
3:00 PM	3:10 PM	62	
3:10 PM	3:20 PM	79	
3:20 PM	3:30 PM	108	249
3:30 PM	3:40 PM	96	
3:40 PM	3:50 PM	101	
3:50 PM	4:00 PM	114	311
4:00 PM	4:10 PM	117	
4:10 PM	4:20 PM	107	
4:20 PM	4:30 PM	93	317
4:30 PM	4:40 PM	106	
4:40 PM	4:50 PM	130	
4:50 PM	5:00 PM	113	349
Total			**3650**

White Tower

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	10	
9:50 AM	10:00 AM	20	30
10:00 AM	10:10 AM	9	
10:10 AM	10:20 AM	69	
10:20 AM	10:30 AM	27	105
10:30 AM	10:40 AM	15	
10:40 AM	10:50 AM	86	
10:50 AM	11:00 AM	46	147
11:00 AM	11:10 AM	142	
11:10 AM	11:20 AM	165	
11:20 AM	11:30 AM	82	389
11:30 AM	11:40 AM	48	
11:40 AM	11:50 AM	65	
11:50 AM	12:00 PM	115	228
12:00 PM	12:10 PM	98	
12:10 PM	12:20 PM	129	
12:20 PM	12:30 PM	103	330
12:30 PM	12:40 PM	101	
12:40 PM	12:50 PM	119	
12:50 PM	1:00 PM	108	328
1:00 PM	1:10 PM	130	
1:10 PM	1:20 PM	147	
1:20 PM	1:30 PM	123	400
1:30 PM	1:40 PM	121	
1:40 PM	1:50 PM	104	
1:50 PM	2:00 PM	123	348
2:00 PM	2:10 PM	134	
2:10 PM	2:20 PM	99	
2:20 PM	2:30 PM	111	344
2:30 PM	2:40 PM	89	
2:40 PM	2:50 PM	114	
2:50 PM	3:00 PM	73	276
3:00 PM	3:10 PM	123	
3:10 PM	3:20 PM	160	
3:20 PM	3:30 PM	76	359
3:30 PM	3:40 PM	155	
3:40 PM	3:50 PM	60	
3:50 PM	4:00 PM	125	340
4:00 PM	4:10 PM	91	
4:10 PM	4:20 PM	120	
4:20 PM	4:30 PM	145	356
4:30 PM	4:40 PM	78	
4:40 PM	4:50 PM	91	
4:50 PM	5:00 PM	70	239
Total			4219
5:00 PM	5:10 PM	90	
5:10 PM	5:20 PM	55	
5:20 PM	5:30 PM	4	149
Total			**4368**

Total Number of People Entering the Tower of London: 5,702

April 8, 2008

IN & OUT

Start Time	End Time	# of visitors	Total
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	0	
9:50 AM	10:00 AM	0	0
10:00 AM	10:10 AM	0	
10:10 AM	10:20 AM	0	
10:20 AM	10:30 AM	0	0
10:30 AM	10:40 AM	0	
10:40 AM	10:50 AM	0	
10:50 AM	11:00 AM	5	5
11:00 AM	11:10 AM	2	
11:10 AM	11:20 AM	2	
11:20 AM	11:30 AM	0	4
11:30 AM	11:40 AM	2	
11:40 AM	11:50 AM	7	
11:50 AM	12:00 PM	4	13
12:00 PM	12:10 PM	30	
12:10 PM	12:20 PM	20	
12:20 PM	12:30 PM	7	57
12:30 PM	12:40 PM	13	
12:40 PM	12:50 PM	7	
12:50 PM	1:00 PM	8	28
1:00 PM	1:10 PM	21	
1:10 PM	1:20 PM	4	
1:20 PM	1:30 PM	10	35
1:30 PM	1:40 PM	13	
1:40 PM	1:50 PM	5	
1:50 PM	2:00 PM	21	39
2:00 PM	2:10 PM	0	
2:10 PM	2:20 PM	9	
2:20 PM	2:30 PM	15	24
2:30 PM	2:40 PM	24	
2:40 PM	2:50 PM	17	
2:50 PM	3:00 PM	20	61
3:00 PM	3:10 PM	11	
3:10 PM	3:20 PM	4	
3:20 PM	3:30 PM	8	23
3:30 PM	3:40 PM	27	
3:40 PM	3:50 PM	17	
3:50 PM	4:00 PM	37	81
4:00 PM	4:10 PM	13	
4:10 PM	4:20 PM	25	
4:20 PM	4:30 PM	42	80
4:30 PM	4:40 PM	12	
4:40 PM	4:50 PM	24	
4:50 PM	5:00 PM	21	57
		Total	507

HANDS-ON-HISTORY

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	0	
9:50 AM	10:00 AM	0	0
10:00 AM	10:10 AM	13	
10:10 AM	10:20 AM	33	
10:20 AM	10:30 AM	9	55
10:30 AM	10:40 AM	23	
10:40 AM	10:50 AM	53	
10:50 AM	11:00 AM	37	113
11:00 AM	11:10 AM	40	
11:10 AM	11:20 AM	34	
11:20 AM	11:30 AM	29	103
11:30 AM	11:40 AM	98	
11:40 AM	11:50 AM	106	
11:50 AM	12:00 PM	90	294
12:00 PM	12:10 PM	111	
12:10 PM	12:20 PM	121	
12:20 PM	12:30 PM	147	379
12:30 PM	12:40 PM	91	
12:40 PM	12:50 PM	134	
12:50 PM	1:00 PM	110	335
1:00 PM	1:10 PM	124	
1:10 PM	1:20 PM	82	
1:20 PM	1:30 PM	99	305
1:30 PM	1:40 PM	102	
1:40 PM	1:50 PM	121	
1:50 PM	2:00 PM	121	344
2:00 PM	2:10 PM	75	
2:10 PM	2:20 PM	104	
2:20 PM	2:30 PM	124	303
2:30 PM	2:40 PM	102	
2:40 PM	2:50 PM	134	
2:50 PM	3:00 PM	136	372
3:00 PM	3:10 PM	113	
3:10 PM	3:20 PM	138	
3:20 PM	3:30 PM	127	378
3:30 PM	3:40 PM	133	
3:40 PM	3:50 PM	118	
3:50 PM	4:00 PM	134	385
4:00 PM	4:10 PM	125	
4:10 PM	4:20 PM	197	
4:20 PM	4:30 PM	170	492
4:30 PM	4:40 PM	111	
4:40 PM	4:50 PM	134	
4:50 PM	5:00 PM	100	345
		Total	4203

WHITE TOWER

Start Time	End Time	# of visitors	
9:00 AM	9:10 AM	0	
9:10 AM	9:20 AM	0	
9:20 AM	9:30 AM	0	0
9:30 AM	9:40 AM	0	
9:40 AM	9:50 AM	33	
9:50 AM	10:00 AM	28	61
10:00 AM	10:10 AM	12	
10:10 AM	10:20 AM	18	
10:20 AM	10:30 AM	9	39
10:30 AM	10:40 AM	73	
10:40 AM	10:50 AM	33	
10:50 AM	11:00 AM	37	143
11:00 AM	11:10 AM	50	
11:10 AM	11:20 AM	78	
11:20 AM	11:30 AM	100	228
11:30 AM	11:40 AM	124	
11:40 AM	11:50 AM	162	
11:50 AM	12:00 PM	136	422
12:00 PM	12:10 PM	150	
12:10 PM	12:20 PM	112	
12:20 PM	12:30 PM	104	366
12:30 PM	12:40 PM	216	
12:40 PM	12:50 PM	103	
12:50 PM	1:00 PM	75	394
1:00 PM	1:10 PM	129	
1:10 PM	1:20 PM	89	
1:20 PM	1:30 PM	142	360
1:30 PM	1:40 PM	126	
1:40 PM	1:50 PM	78	
1:50 PM	2:00 PM	87	291
2:00 PM	2:10 PM	107	
2:10 PM	2:20 PM	145	
2:20 PM	2:30 PM	105	357
2:30 PM	2:40 PM	191	
2:40 PM	2:50 PM	173	
2:50 PM	3:00 PM	230	594
3:00 PM	3:10 PM	180	
3:10 PM	3:20 PM	76	
3:20 PM	3:30 PM	185	441
3:30 PM	3:40 PM	145	
3:40 PM	3:50 PM	176	
3:50 PM	4:00 PM	176	497
4:00 PM	4:10 PM	172	
4:10 PM	4:20 PM	142	
4:20 PM	4:30 PM	100	414
4:30 PM	4:40 PM	117	
4:40 PM	4:50 PM	54	
4:50 PM	5:00 PM	41	212
		Total	4819
5:00 PM	5:10 PM	55	
5:10 PM	5:20 PM	22	
5:20 PM	5:30 PM	7	84
		Total	4903

Total Number of People Entering the Tower of London: 6,284

Appendix K

Figure 18: "Timelessness of Armor" display

Figure 19: "Samurai" display

Figure 20: Greco-Roman Helmets

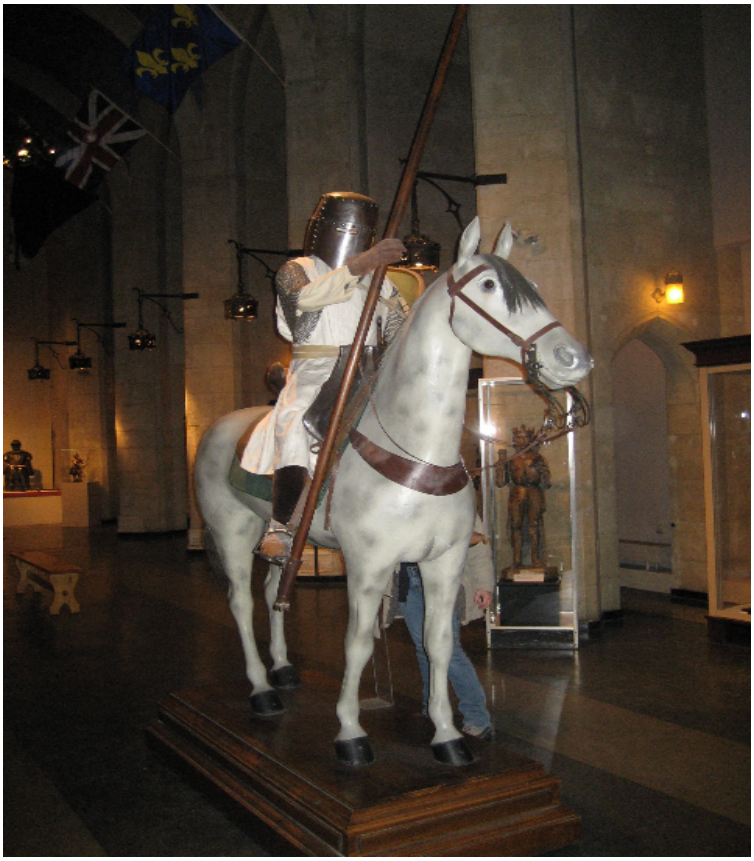

Figure 21: Full-Scale Crusader and Horse in the Great Hall

Figure 22: Suits of Armor left

Figure 23: Suits of Armor right

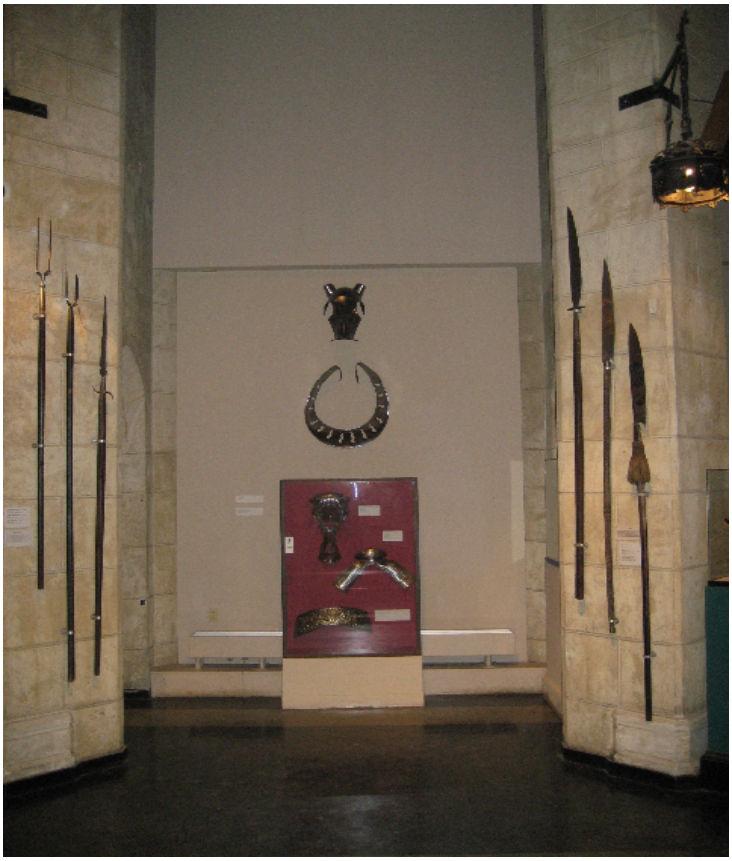

Figure 24: Pikes along one wall of the Great Hall

Figure 25: Full-scale mock sword battle

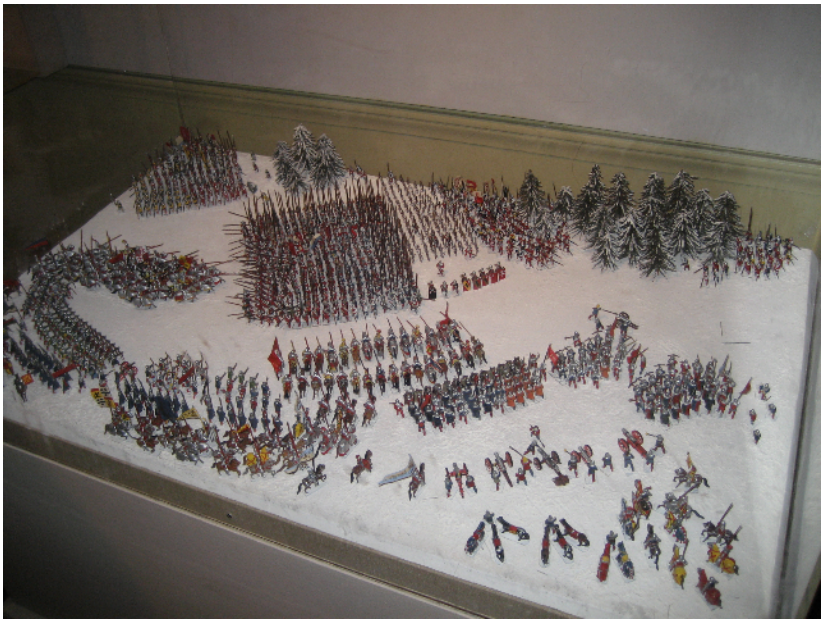

Figure 26: Miniature of Swiss battle

Figure 27: Early European crossbow

Figure 28: Stairwell exit of the Great Hall

Appendix L

Figure 29: "Norman Power"

Figure 30: "Dead on Target"

Figure 31: "Heading for Trouble"

Figure 32: "Medieval Arms Race"

Figure 33: "Majestic Might"

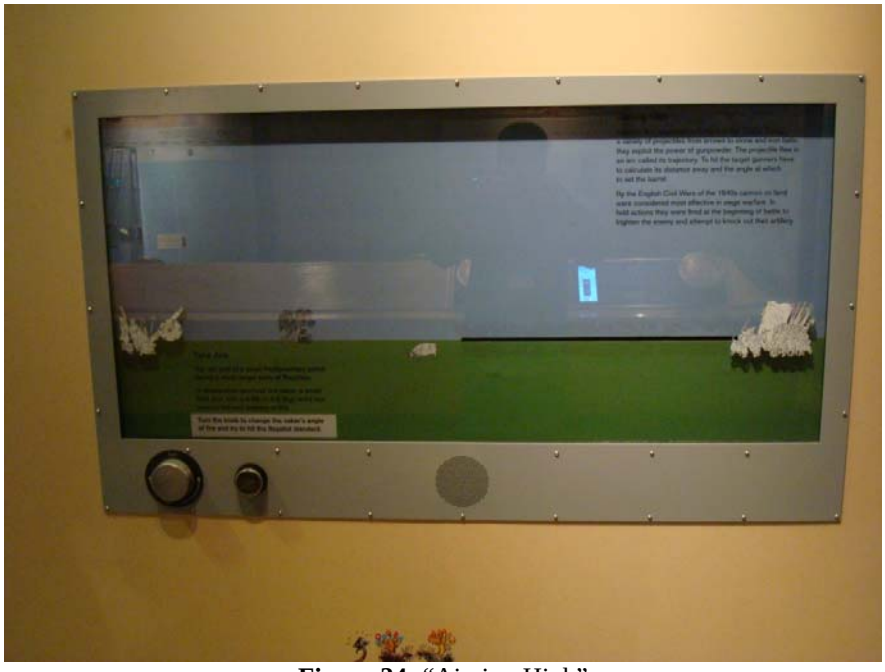

Figure 34: "Aiming High"

Figure 35: "Trigger Happy"

Figure 36: "Firepower"

Figure 37: “Threat and Response”

Appendix M

Visitor Responses

Liked:

- Loved interactivity, something for students to do--22
- Liked how visual tour downstairs had subtitles- maybe have a book next to each exhibit with a translation of the exhibits—22
- Hands-on part was wonderful—22
- Hands-On-History was great—37
- Interactivity is good—129
- It was really cool, enjoyable for all ages—142
- Learned about how interactivity can be used in the classroom—145
- The exhibit is very interesting, especially for school boys—199
- More interactivity, it is more realistic and you can feel instead of look—215
- For children it is brilliant—268
- Would love more interactive exhibits if they were in a different and in a larger building—273
- Good for kids to learn –298
- It is more for children-older couple
- Good for children to learn, it is the only way they will—324
- Wish there were more hands-on exhibits—332
- Gave it two thumbs up—wish you could touch the stuff downstairs—447
- Kid was bored downstairs but loved upstairs—514
- Lovely and entertaining—524
- Glass cases only do so much – touching them is better—526

Disliked:

- Fusilier too modern—26
- Did not interact because it is at the end—breezed over it—a lot people in the way—36
- Found the subject un-enthusing so did not interact or learn—43
- Dislike TV- cannot interact--44
- TV was dry--46
- You can't pick up the swords in the gauntlet—47
- Interacting for children and teens only—51
- Science Museum does better job; touch is difficult to do with group; designed for individuals; gauntlet is not intuitive, its passive--70
- Too many people—71
- Bland, better for the young—74
- Too much interactivity already to see and do—170
- Everyone touches Henry VIII and fusilier at same time—200
- Gauntlet is awkward—200
- Should be more than one of each display—208

- Fusilier should not be in this building, it is too recent and not about history—215
- Not enough time to interact so did not lear—263
- Too many kids touching the buttons at the same time, could not interact—297
- Like to see more of models with humans in them (like threat and response)—297
- Wish there were more that had computer technology—298
- Dislike all the talking ones because they only speak English—312
- It is really only a boy's room—326
- Would like more instructions—359
- Too many kids—362
- Displays are too high—366
- Wife of bilingual male said she wished there was more in the French language that could be interacted with—449
- Woman has son in army and Threat and response is too real—471
- Interactive exhibits don't wow me—506
- Want to see how armor is made (blacksmith)—506
- Want to see more people in costume to encourage feeling of medieval times—506
- Want to see film of horse with and without armor—506
- Wish to see more weapons that could be picked up—506
- Would like to see an overhead projection with short clips and sound—681
- Wish there was another bow—695
- Wish you could try on armor—735
- Didn't want to view last display because it is "hits too close to home"—741
- These are historical buildings, too much hands-on would take away from that—743
- Designed for one or two children to view at a time, so crowdedness is a big issue—762

Appendix N

Individual Display Observations 04/09/08

Norman Power
-People will try both sides of the exhibit until they realize the questions are the same.
-Kids in families rush up to the exhibit and may not even read a question before picking up a weapon. Adults hold back and read the questions and instructions first. Adults may also read the questions to very young children.
-Many do not understand and/or read the label; they lift a weapon, then when it says "try again", they lift harder.
-Some people pull *very* hard on the weapons.
-Large groups that come in walk by if there is a large crowd, and then may come back after the crowd has thinned out.
-Teenagers seem to cluster around the exhibit more than other age groups.
-People who stand back and see all the questions get answered will sometimes still go up to the display and pick up the weapons themselves.
-People like lifting the weapons, more to get an impression of their size and weight than to respond to the questions.
-Maybe put a divider between the two sets. Put more weapons – daggers, rapier.
-Maybe allow people to touch a question to encourage cooperation; one person presses the question, another responds.

Right on Target
-Given enough time, people go until they get "Dead on Target," or they stop after about two attempts.
-Some people go again even though they get a "Dead on Target."
-Few people will pull the bow back even though the light is still moving up the levels.
-Many people cut the line that is formed.
-With large crowd, people usually take only one turn, and adults will usually just watch.
-With small crowd, people will do it several times until they get a hit, and adults will also interact.
-Most don't realize the strength needed to pull it back; however it is good that way because it poses a challenge which is what people want.
-Very few people notice, understand, or take into account the wind.
-People don't mind watching 2-3 people in front of them interact, but will get impatient if they have to wait any longer.
-Some will leave the bow because of crowd, go to another display, and return once crowd decreases.
-A few visitors don't read the different levels of accuracy, so they think you have to pull it back as far as you can.

-Parents will help young kids who aren't strong enough to pull bow back, it is good to see the parents get involved.

Heading for Trouble
-People go to the nearest open helmet even if it is too short or too tall.
-People will often try multiple helmets.
-Older people read the labels more often than young people.
-Exhibit is commented on a lot
-Older people will read the label and timeline if they are in a line.
-Large groups will take over all three helmets.
-People will stand in a line even if it is very long.
-People who don't stop for other displays will stop at the helmets.
-Many hang from the speaker parts of the higher helmet, especially children. The display backing surrounding the helmets sees serious damage.
-The timeline is usually not read because people can quickly access it and move on.

Medieval Arms Race
-Some may want to pick swords up but the display would not be self-policing if the visitors could pick them up and fight with each other.
-Two swords allow twice as many people to interact, but there are those who feel they have to try out both swords.
-People don't seem to notice the video, or if they do they don't view it for long.
-It takes a longer time to interact at this display than at others.
-A few people simply don't understand; they think there should be more to it.
- The items are inside the display, low to the ground, and it is hard for more than four to attend – two can grasp the swords, two can watch.
-Adults seemed to interact for the touch or feel, whereas children would pretend to be riding the horse while wielding the sword or punching someone with a gauntlet.

Majestic Might
-One person will interact while others stand back and watch.
-Some people will try to push the speaker or red light.
-People often try to activate more than one weapon at a time.
-Young people interact with the exhibit quickly while old people may stand back and watch others interact.

Aiming High
-Adults let kids interact more often than interacting themselves.
-People will attempt different angles often going through all three settings, even if they have already hit the target.
-More people try it when the exhibit is working and moving.

-People will turn it to try to find more than three settings on the knob.
-People will try multiple shots if there is no line behind them.
-Some fire for a 2nd or 3rd attempt and leave without watching where it went.
-If people hit on their first try they do it again and miss on purpose to see what it says.
-Many stay for a while and seem to enjoy it but don't look satisfied when they leave.
-Kids often turn the knob as hard and as far as they can.
-People will try to move an immobile target by hitting the glass or turning the knob.
-People will watch the cannonball's path.
-Older people will seldom try it without kids.
-If target isn't working properly it is sometimes impossible to hit, or it is stuck on the farthest setting so you just have to aim the cannon to the highest setting and it will hit the target easily.
-Most don't understand why it says "Mind the Cow," although they find it humorous.
-Boys tend to be less satisfied to hit, girls tend to cheer.
-Few people, if anyone, read the label.
-"Well done, you hit me" could be changed to a more exciting phrase.

Trigger Happy

-People often will try to pull/prime/set the trigger.
-Visitors will touch every bullet hole in the metal plate.
-Gun is lifted from different places i.e. the stock, trigger, or barrel.
-Kids will go up and pick up the gun, while adults will read the caption.
-People will more often read the labels if there is a line.
-The gun is often lifted several times
-People will look at the side and back of the plate.
-Some people will pass by if there is a long line.
-The display is quick to manipulate so it is rarely crowded.
-Many people will comment on it.
-Great display for people to take pictures with.
-Most don't know to pick gun up unless they see others or happen to read the directions (which few do). Make the directions larger (some will only feel the gun and not pick it up).

Fire Power

-Majority of people entirely ignore display but will stop to listen to Threat and Response.
-Audio may help the display but it would conflict with the audio from Threat and Response.
-Several people of all ages walk up to it and touch the screen as though it is hands-on.
-Adults more inclined to stop and watch then children.
-Even though many walk right past it, most of them viewed the display immediately before and after.

-Perhaps instead of a video, Fire Power could have a touch screen like those in the courtyard or those at the museum of science.

Threat and Response
-*Molotov Cocktail* – everyone touches the cloth part of the item, although it is activated by touching the glass.
-People touch the speakers and LED lights, expecting something to happen.
-*Bullet* – it is activated by grabbing the cube rather than just touching it. Many people struggle trying to activate it.
-Many viewers touch the objects when it is already describing something.
-The descriptions can be heard from the other side of the room; some people notice it from Norman Power.
-People are surprised to find that it talks.
-Bayonet is by far the most touched.

Appendix O

	A	B	C	D	E
1	TIME	NATASHA	MAX	DAN	STEPHAN
2	9:00 AM	In-and-Out	White Tower Entrance	Hands on History	(stuff)
3	9:30 AM		White Tower Entrance	Hands on History	In-and-Out
4	10:00 AM	White Tower Entrance		Hands on History	In-and-Out
5	10:30 AM	White Tower Entrance	Hands on History		In-and-Out
6	11:00 AM	White Tower Entrance	Hands on History	In-and-Out	
7	11:30 AM		Hands on History	In-and-Out	White Tower Entrance
8	12:00 PM	Hands on History		In-and-Out	White Tower Entrance
9	12:30 PM	Hands on History	In-and-Out		White Tower Entrance
10	1:00 PM	Hands on History	In-and-Out	White Tower Entrance	
11	1:30 PM		In-and-Out	White Tower Entrance	Hands on History
12	2:00 PM	In-and-Out		White Tower Entrance	Hands on History
13	2:30 PM	In-and-Out	White Tower Entrance		Hands on History
14	3:00 PM	In-and-Out	White Tower Entrance	Hands on History	
15	3:30 PM		White Tower Entrance	Hands on History	In-and-Out
16	4:00 PM	White Tower Entrance		Hands on History	In-and-Out
17	4:30 PM	White Tower Entrance	Hands on History		In-and-Out
18	5:00 PM	White Tower Entrance	Hands on History	In-and-Out	
19	5:30 PM		Hands on History	In-and-Out	White Tower Entrance
20	6:00 PM	Hands on History		In-and-Out	White Tower Entrance
21					

Appendix P

Enjoyment of Exhibit

Demographic Breakdown		Percentage of People who enjoyed the exhibit
Overall:		98.0%
Gender:	Male	98.0%
	Female	98.0%
Age:	10 and Under	100.0%
	11-17	100.0%
	18-25	98.4%
	26-35	97.2%
	36-49	96.7%
	50+	97.1%
First Language:	English	98.6%
	Non-Enlish	95.6%

Table 9: Demographic Break-Down of Enjoyment

Appendix Q

	Male	Female
Aiming High	2.8%	2.8%
Fire Power	0.6%	0.0%
Heading for Trouble	**10.2%**	**14.4%**
Right on Target	**42.2%**	**36.7%**
Norman Power	12.6%	12.8%
Trigger Happy	4.0%	3.9%
Majestic Might	8.3%	9.4%
Medieval Arms	9.5%	8.9%
Threat and Response	7.1%	5.3%
Other	2.7%	5.8%

Table 10: Percentage of people who said each display was their favorite (by gender):

Appendix R

	10 and Under	11-17	18-25	26-35	36-49	50+
Aiming High	**12.3%**	0.0%	0.0%	1.0%	4.4%	1.1%
Fire Power	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%
Heading for Trouble	8.2%	7.3%	15.1%	14.1%	14.4%	12.6%
Right on Target	45.2%	**58.7%**	42.0%	39.4%	32.0%	**27.4%**
Norman Power	9.5%	8.3%	**14.3%**	**17.2%**	**11.6%**	**16.8%**
Trigger Happy	5.5%	2.8%	1.7%	2.0%	3.9%	9.5%
Majestic Might	1.4%	6.4%	7.6%	6.1%	**12.7%**	**15.8%**
Medieval Arms	11.0%	7.3%	10.9%	12.1%	11.0%	**2.1%**
Threat and Response	5.5%	9.2%	5.0%	0.0%	6.6%	10.5%
Other	1.4%	0.0%	1.7%	8.1%	3.4%	4.2%

Table 11: Percentage of people who said each display was their favorite (by age):

Appendix S

	English	Non-English
Aiming High	2.2%	2.9%
Fire Power	0.3%	0.0%
Heading for Trouble	10.1%	16.2%
Right on Target	47.5%	44.1%
Norman Power	10.3%	16.2%
Trigger Happy	3.6%	2.9%
Majestic Might	9.0%	3.7%
Medieval Arms	7.9%	9.6%
Threat and Response	6.2%	2.2%
Other	2.9%	2.2%

Table 12: Percentage of people who said each display was their favorite (by language):

Appendix T

Threat and Response	22.2%
Crowd	15.8%
Coins	13.9%
Fire Power	12.0%
Medieval Arms	12.0%
Aiming High	8.2%
Heading for Trouble	8.2%
Other	2.6%
Norman Power	1.9%
Right on Target	1.3%
Trigger Happy	1.3%
Majestic Might	0.6%

Table 13: Visitor's Most Disliked Displays

Appendix U

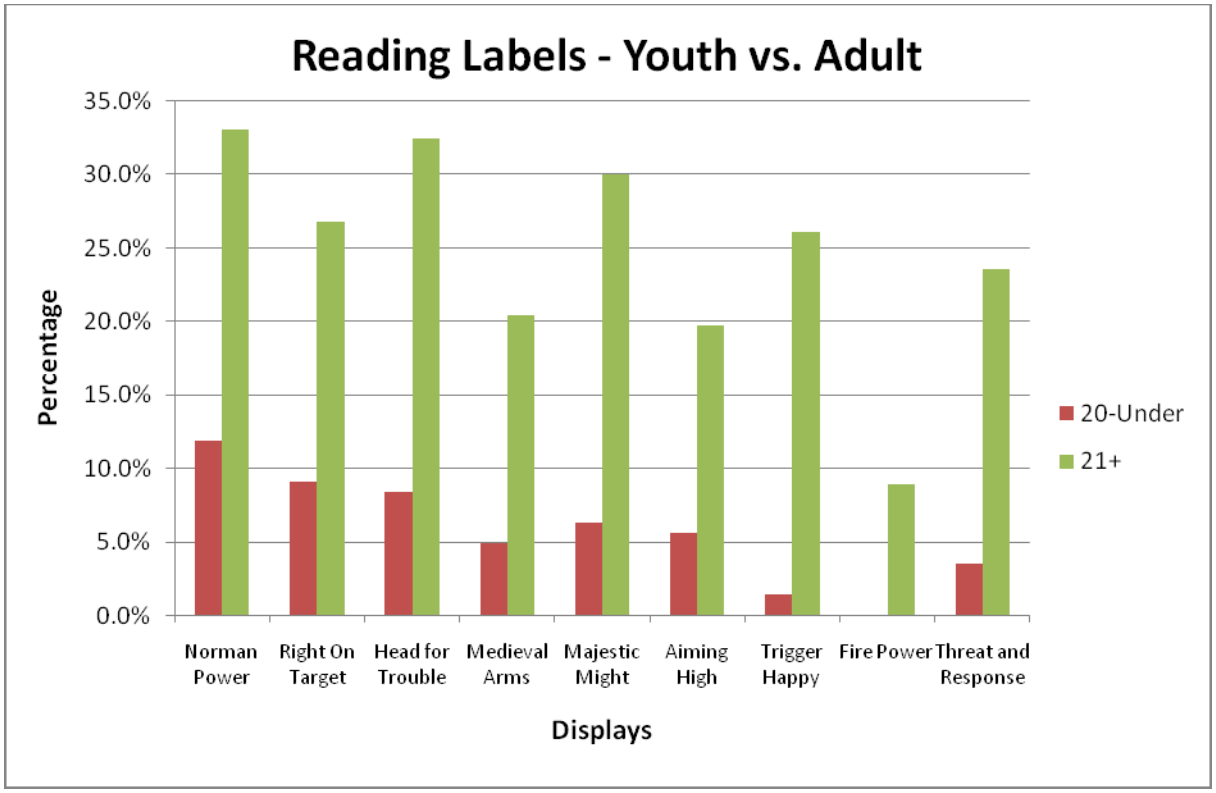

Figure 38: Percentage of Visitors who Read Labels (Youth vs. Adult)

Appendix V

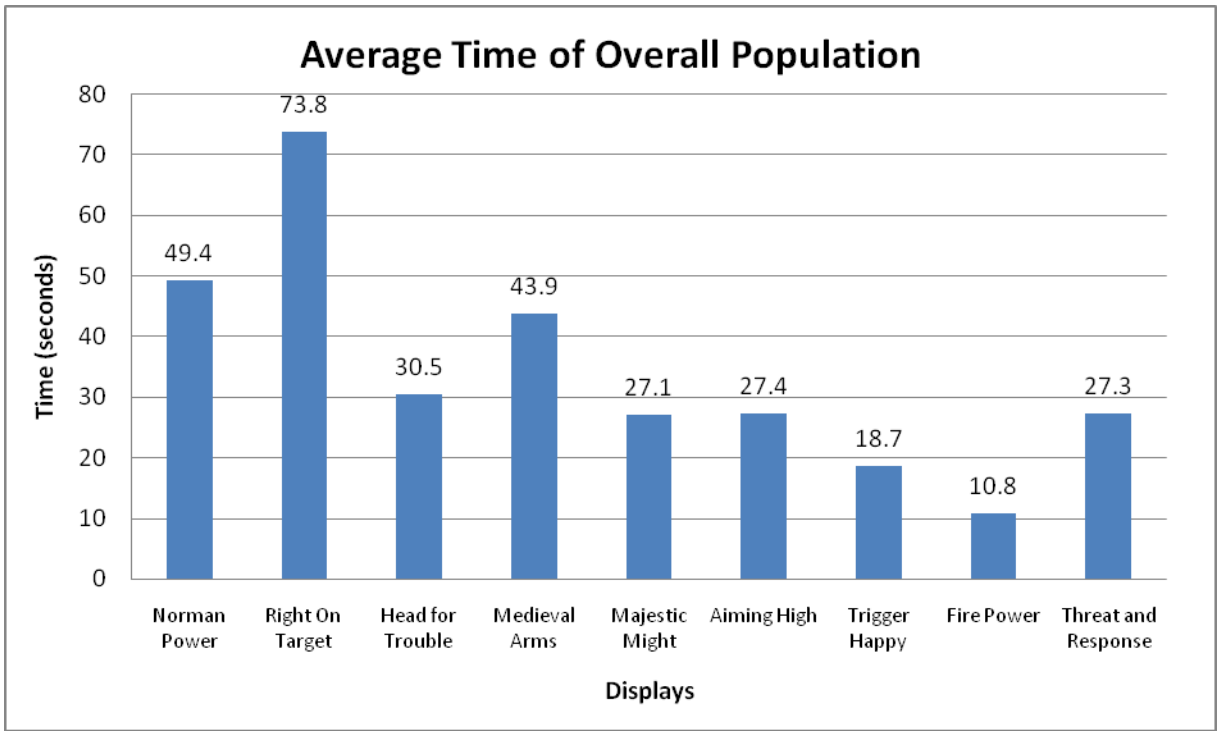

Figure 39: Average Time Spent at Each Display by the Overall Population

Appendix W

	3/26/08	4/4/08	4/8/08	Average
Tower of London	8733	5702	6284	6906
White Tower	6260	4219	4819	5099
Hands on History	5286	3650	4203	4380
Immediate Exits	522	373	507	467
Interacted	4764	3277	3696	3912

Table 14: Total Counting Numbers

	Entered White Tower	Entered Exhibit	Interacted
Entered Exhibit	-	-	90.1%
Entered White Tower	-	84.4%	76.1%
Entered Tower Complex	71.7%	60.5%	54.6%

Table 15: Counting March 26th, 2008

	Entered White Tower	Entered Exhibit	Interacted
Entered Exhibit	-	-	89.8%
Entered White Tower	-	86.5%	77.8%
Entered Tower Complex	74.0%	64.0%	57.5%

Table 16: Counting April 4th, 2008

	Entered White Tower	Entered Exhibit	Interacted
Entered Exhibit	-	-	87.9%
Entered White Tower	-	87.2%	76.7%
Entered Tower Complex	76.7%	66.9%	58.8%

Table 17: Counting April 8th, 2008

Average	Entered White Tower	Entered Exhibit	Interacted
Entered Exhibit	-	-	89.3%
Entered White Tower	-	85.9%	76.7%
Entered Tower Complex	73.8%	63.4%	56.7%

Table 18: Counting Average of All Three Days