Making Meaning of von Hagens’ *Body Worlds*: Towards an Interdisciplinary Approach to Science Exhibitions

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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Ontario Institute for Studies in Education
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2013

Abstract

*Body Worlds* is a traveling exhibition of plastinated human cadavers that offers the general public an opportunity to experience the human body in a unique way. It has been met with controversy and awe; public reactions and responses have been mixed. This case study research explored visitor responses to this controversial science exhibition, and examined the meaning visitors made of their experience. Specifically, the following research questions directed this study: Within the context of the *Body Worlds* exhibition: (a) What meaning did visitors make and how did they respond to the exhibits? (b) What tensions and issues arose for visitors? and (c) What did this type of exhibition convey about the changing role of science centres and the nature of their exhibitions? The primary sources of data for this study were 46 semi-structured interviews with visitors to the exhibition, observation notes, and 10 comment books including approximately 20,000 comments. Data suggested that the personal, physical, and sociocultural contexts (Falk & Dierking, 2000) contributed to visitor meaning-making. The use of plastinated human cadavers within this exhibition raised ethical and moral questions and
controversies about body procurement, use of human cadavers in display, representations of the bodies, and issues related to the sanctity of life. The tensions and issues identified by visitors demonstrated that messages (intended or unintended) located within *Body Worlds* were critically examined by visitors and called into question. Finally, data from this study suggested that an interdisciplinary approach to the presentation of science served to enhance accessibility for the viewer. This exhibition demonstrated that visitors responded positively and made personal connections when the arts, spirituality, edutainment, issues, and a combination of historical and contemporary museum practices were used to present science.
Acknowledgements

I would like to express my sincerest appreciation to my Supervisor Erminia Pedretti, whose passion for informal learning and controversial exhibitions was contagious. Thank you for inviting me to work on the Body Worlds project with you and the team, and for encouraging me to think deeply about informal learning spaces and the connections of museums to education. Without your support, guidance and encouragement this thesis would not have come to fruition.

Thank you to my committee member, John Wallace, whose expertise in the area of methodology strengthened this research. Thank you for graciously stepping in for Erminia when she was on maternity leave and for asking me thought provoking questions that led me to think deeply about meaning-making. Your direction and guidance was greatly appreciated.

I must also thank my third committee member, Mark Evans, for encouraging me to consider sociocultural perspectives and their centrality to meaning-making.

A very special thank you to Susan Jagger, my fellow graduate student and friend. Throughout the past four years our time together has truly enriched my life and broadened my perspectives on the field of education. Who would have thought that a project which began at a zoo would have led us to share so many experiences all over the world. Thank you for your unwavering support and our many conversations over lunch, dinner and drinks. I have no doubt that we will remain lifelong colleagues and friends. I look forward to future collaborations with you.
In addition, I thank the Ontario Science Centre and *Body Worlds* for allowing me to conduct this research. I also thank the participants who freely gave their time and shared their deeply personal stories.

My mother, Marianna, always wanted the best for her children and stressed the importance of us going to school. At the time, she likely did not imagine that I would have been in school for this long! Thank you mom for encouraging me to keep things in perspective and for reminding me to remember the rest of life that lies beyond school and work. This paper would not have been possible without your love and support. A heartfelt thank you to the remainder of my family: my father, Paul; my sister, Anna Maria; my brother-in-law, Mark; my niece, Lana; and my nephew, William, who inspire me to be the best possible person and educator I can be. I must also thank my friends: Amanda, Christopher, Nick, Christine, April, Megan and Lisa for their positive energy and motivation throughout this process.

And thank you to my husband Yannis. You have patiently waited for me to accomplish my goals, and for this I am most grateful.

Lastly, thank you to my examination committee: Leonie Rennie, David Booth, Douglas McDougall, and Virginia Maclaren, for a rigorous and thought-provoking academic defense.

My sincerest thanks to all.
Table of Contents

Abstract ........................................................................................................................ii

Acknowledgements ........................................................................................................iv

Table of Contents ...........................................................................................................vi

List of Tables .....................................................................................................................x

List of Appendices ..........................................................................................................xi

Chapter One: Introduction

Introduction .....................................................................................................................1
Purpose of the Study and Research Questions ...............................................................3
Background of the Researcher and Context .................................................................5

Chapter Two: Literature Review – The Landscape of the Museum and Science Centre

History and Role of the Museum ......................................................................................8
History and Role of the Science Centre .........................................................................17
Scientific Literacy and the Science Centre ......................................................................21
Representation of Science in Exhibitions ......................................................................27
Politics and Power in Display .........................................................................................32
Controversial Issues ......................................................................................................36
*Body Worlds*: A Controversial Issues Based Exhibition ..............................................38
Summary .......................................................................................................................43

Chapter Three: Literature Review – Meaning-Making and Learning in Informal Settings

Setting, Flow and Identity ..............................................................................................46
Contextual Model of Learning: Making Meaning and the Visitor Experience ..............51
Personal Context ............................................................................................................55
Physical Context ............................................................................................................58
Sociocultural Context ....................................................................................................59
Visitor Research with *Body Worlds* ...........................................................................64
Summary .......................................................................................................................70

Chapter Four: Methodology and Methods

Research Questions Revisited .......................................................................................72
Methodology ...................................................................................................................73
Epistemological Orientation ..........................................................................................73
Research Design ............................................................................................................74
Chapter Five: Visitor Meaning-Making

Motivation for Attendance ................................................................. 95
Contexts for Learning ......................................................................... 97
Personal Context .................................................................................. 99
  Narratives .......................................................................................... 99
    Autobiographical Stories ................................................................. 99
    Family-Related Stories ................................................................. 100
    School and Work-Related Stories ............................................... 102
Validations and Reinforcements .......................................................... 103
  Smoking ............................................................................................ 104
  Diet and Exercise ............................................................................. 106
  General Health and Stress ............................................................... 108
Transpositions ...................................................................................... 110
  Transposition onto the Self .............................................................. 110
  Transposition onto Family/Friends .................................................. 112
  Transposition onto the General Public ............................................ 114
Reverence ............................................................................................. 115
Physical Context .................................................................................. 118
Design Features of Body Worlds ......................................................... 118
Three-Dimensional Viewing ................................................................. 120
Multisensory Experiences .................................................................. 121
  Visual ............................................................................................... 122
  Auditory ........................................................................................... 125
  Kinaesthetic ...................................................................................... 126
Sociocultural Context .......................................................................... 127
  Centrality of Dialogue .................................................................... 127
  Sociocultural Influences .................................................................. 131
    Spirituality and Religion ............................................................... 131
    Sanctity of Life .............................................................................. 135
    Occupation-related Identity ......................................................... 136
Discussion .............................................................................................. 140
Personal Context .................................................................................. 140
  Transposition .................................................................................. 142
## Chapter Six: Tensions and Issues

- **Controversial Issues** .......................................................... 162
- **Fetal Display and consent** .................................................... 163
- **Plastinate Detail** .............................................................. 165
- **Sexual Representation** ....................................................... 166
- **Gender Representation** ...................................................... 168
- **Body Image and Representation** .......................................... 170
- **Cost** ................................................................................. 172
- **Discussion** .......................................................................... 173
- **Summary** ............................................................................ 179

## Chapter Seven: Changing Role of Science Centres

- **Purpose of the Science Centre** ............................................. 181
- **Science Centre as a Place of Science** ................................... 181
- **Science Centre as a Place for Learning** ................................ 183
- **Science Centre as a Place to Present Relevant Issues** .......... 185
- **Science Centre as a Place for Hands-On Activities** ............ 187
- **Science Centre as a Place for Children** ............................... 189
- **Science Centre as a Place of Credibility** ............................. 191
- **Science Centre as a Place for Artistic Display** .................... 192
- **Visitors Suggestions to Improve the *Body Worlds* Exhibition** 195
- **Travelling Exhibits** ............................................................. 195
- **Docents** .............................................................................. 197
- **Multimedia and Interactivity** .............................................. 197
- **Further Information about Plastinates** ............................... 199
- **Further Information on Process** ........................................ 200
- **Discussion** .......................................................................... 201
- **Science Centre as a Place of Science** ................................ 204
- **Science Centre as a Place for Learning Science** ................ 205
- **Science Centre as a Place to Present Relevant Issues** .......... 208
- **Science Centre as a Place for Hands-On Activities** ............ 209
- **Science Centre as a Place for Children** ............................... 213
- **Science Centre as a Place of Credibility** ............................. 215
- **Science Centre as a Place for Artistic Display** .................... 217
- **Summary** ............................................................................ 219
- **Implications for Curators** .................................................. 221
Chapter 8: Museum Practices, Representations and Cross-Disciplinarity

Objects and Hands-On Exhibits ................................................................. 225
Broadening the Science Centre Mandate ............................................. 227
Merging Art and Science ................................................................. 229
Merging Spirituality and Science ......................................................... 231
Integrating Science and Entertainment .............................................. 233
Accepting Science and Questioning Science ..................................... 235

References .......................................................................................... 239
List of Tables

Table 1: Participant Demographics ................................................................. 78

Table 2: Summary of Codes for Research Question (a) .................................. 84
List of Appendices

Appendix A: Interview protocol ................................................................. 252
Chapter One
Introduction

Informal learning centres, specifically museums, have increased in popularity over the past 30 years as places for active learning beyond classroom contexts. The museum, including those of art, science, history, zoos, aquariums, botanical gardens, and historical sites, are being intentionally designed to make them appealing for the general public. Millions of people including families, school groups, and tourists, visit museums willingly and often, providing a diverse and rich sample from which meaning-making and the visitor experience can be explored. Visitors choose to attend museums (here, the term museum is used in its broadest sense, to include science centres, art galleries, etc.) in order to satisfy identity-related needs and to learn something new (Falk, 2009). In this way, meaning-making becomes embedded within a context the visitor freely enters into, providing for actively engaged research subjects.

The Body Worlds exhibition entered into mainstream museums facing much criticism and public outcry. The use of plastinated human cadavers within this exhibition has raised controversy surrounding body procurement, use of human cadavers for display, burial, and questions around the ethical and moral dimensions of the display. Nonetheless, each year in over 45 cities around the world, millions of visitors are drawn to view iterations of Body Worlds (e.g., Story of the Heart, The Brain, etc.) which claim to, “open up the opportunity to better understand the human body and its functions” (Gunther, 2010, Mission of the Exhibitions, para. 2). The Body Worlds exhibition identifies its primary goal to be one of health education, presenting human specimens for viewing.
*Body Worlds* is an uncharacteristic display for a science centre. It harkens back to traditional museum exhibition design: *cabinets of curiosity*, rather than hands-on, interactive displays. The whole body and individual specimen display parallels that of the traditional 16th century cabinet museum display – objects in a glass case meant to be looked at or gazed upon (Bennett, 1995). While the exhibition itself is traditional in its presentation of science, its contemporary use of human cadavers as the medium to present health education is a primary example of how technology is evolving and simultaneously pushing the boundaries of scientific display.

*Body Worlds & The Story of the Heart* (the focus of this study presented at the Ontario Science Centre from 2009-2010) is an exhibition that has been carefully planned and organized to optimize visitors’ experiences as they learn about the cardiovascular system. The exhibition gradually progresses from bones and skeletons, easing visitors into seeing increasingly more elaborate and explicit plastinates. Visitors can walk around full body plastinates, observing them from all angles, or may view individual organs and body slices in glass cases. Throughout the exhibition visitors may choose to read inspirational quotes posted on walls, for example about love, emotion, and perseverance, and may watch a few video presentations related to specific organs or medical procedures scattered throughout the exhibition. Visitors also have the opportunity to physically manipulate organs available at one station or speak to doctors and experts throughout the exhibition to answer any questions or provide further information.

To date, more than 34 million people from all over the world have visited *Body Worlds* suggesting that museums and visitors see great value in this exhibition. It is hoped
that understanding the visitor experience within this controversial exhibition may illuminate visitor meaning-making in the museum and shed light on the potentially changing nature of science centre exhibitions.

**Purpose of the Study and Research Question**

This case study investigated visitor experiences with the *Body Worlds & The Story of the Heart* exhibition. Visitor narratives offered valuable insight into how controversial scientific exhibits led to meaning-making. In this study, visitor *meaning-making* is explored rather than *learning*, as determining what visitors learn in museums is problematic (Allen, 2002; Falk & Dierking, 2000; Pedretti, 2006). Inconsistency exists in what it means to learn, and how to measure learning, particularly in a museum setting. Learning may be interpreted to include knowledge gleaned, or in psychology learning often implies a change in behavior as a result of experience (O’Donnell, 1987). Falk and Dierking (2000) identify meaning-making as a process involved in learning: “This process is at the root of all learning – learning is about meaning-making” (p. 61). In her review, Silverman (1995) details the process of meaning-making, describing how people attempt to make sense of their environment by relating past experiences to the present. She writes that meaning is constructed “in the eyes, heart, and head of the particular beholder” (p. 161), identifying the fundamental role of the individual in creating meaning from experience. Therefore, rather than trying to determine what was learned from the *Body Worlds* exhibition (i.e., specific knowledge gained or change in behaviour), visitors were encouraged to respond and reflect upon their interactions with exhibits, text, docents, and companions while in the *Body Worlds* exhibition, offering insight into their active constructions of meaning. This study focuses on visitor meaning-making by
encouraging visitor reflections and talk through interviews and examination of comments left in visitor books.¹

Most of the research conducted on the Body Worlds exhibition, to this date, has been published in medical (Leiberich, Loew, Tritt, Lahmann, & Nickel, 2006; Moore & Brown, 2007; Preub, 2008,), bioethical (Burns, 2007; Jones, 2007; Myser, 2007), anthropological (Walter, 2004b), sociological (vom Lehn, 2006; Walter, 2004a) and feminist (Kuppers, 2004) journals. No study has analyzed Body Worlds through an educational lens. Conn (2010) notes that museum scholarship has predominantly focused on art and anthropological museums suggesting that further examination of science centres will “yield a different set of questions about the nature of museums, about the relationship between knowledge and display, and about museums and the public…” (p. 5). It was hypothesized that visitors would have much to say as they left this intriguing and controversial exhibition.

The following questions directed this case study:

Within the context of the Body Worlds exhibition:

a. What meaning do visitors make and how do they respond to the exhibits?

b. What tensions and issues arise for visitors?

c. What does this type of exhibition convey about the changing role of science centres and the nature of their exhibitions?

¹ While I understand that meaning-making is foundational to the process of learning I will not use the term learning when discussing my results. The term I prefer is meaning-making which I believe emerged through what people said to me and each other during interviews, and as expressed in comment books. This could be a form of learning, however learning seems to be a much larger and all-encompassing term which was outside the scope of this study.
Background of the Researcher and Context

As a full-time elementary school teacher and life-long learner, I found myself returning to school to pursue a doctoral program part-time. With a background in science, I gravitated towards science education with a specific interest in meaning-making in informal settings. As a teacher I often enrich student experiences through the use of field trips which bring classroom experiences to life allowing students to forge deeper connections with the topic at hand. Specifically, field trips to the science centre offer students a unique experience as they are able to engage in hands-on activities with scientific phenomena and experience relevant issues-based exhibitions for example, exhibitions presenting issues related to the environment. The field trips I take my students on are quite structured and directed, while on the other hand, visitors who are not part of a class visit or tour group often freely visit these centres during their leisure time. It is precisely this difference that piques my interest; a wide variety of people visit science centres for many different reasons and experience it accordingly. Hence my interest in pursuing studies in informal learning spaces.

I enrolled in an informal education class with Dr. Erminia Pedretti to learn more about the potential and purpose of informal centres as sites for science learning. It was through discussion on our graduate class field trip to the local zoo that she invited me to work as part of a team on her SSHRC funded project at the Ontario Science Centre with a specific focus on the Body Worlds exhibition.\(^2\) I immediately agreed to work on this project as it allowed me to merge my interests in science education and informal learning. The unique medium used by this travelling exhibition further piqued my curiosity as it

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\(^2\) While some of the data in this study may have been collected in a team situation the choice of frameworks, selection of relevant data, and analysis was completed independently.
aligned with my personal interest in biology and psychology. I had heard much about the exhibition’s controversial content and wondered how people would react to viewing the dead and what kind of meaning they would make of the exhibition.

I bring particular assumptions and lenses to this work which affects the questions I ask and my interpretation of data. First, as an elementary school teacher, I view the museum as a place for students and the general public to learn, explore, ask questions, and to be challenged. As a classroom teacher, I often attend to museum layout and put structures in place that will aid in the construction of meaning for my students. My educational background in science and part-time work at a hospital leads me to view the body with a clinical approach. I am not offended by the ‘messiness’ of the human body (blood, excrement, smell), but rather marvel at the complexity of this working system that continuously strives for homeostasis. My spirituality, leads me to believe that there is more to the body than simply its physiological components. For me, the body is a combination of both physiological mechanisms and the soul – reflecting the body/mind dualism of Descartes (Rozemond, 2002). The lenses of science and spirituality allow me to view the body as a structure with function that is beautifully made, bringing together the corporeal and ethereal.

My own perceptions about the body are influenced by my prior experience as a dancer. I view the human body as a corporeal form endowed with spirit – the body is an instrument that allows us to accomplish goals, interact with the world, and come to know through experiences, sensations and emotions. In my opinion, our bodies are our temples and as such should be treated with the utmost care and respect. I realize the importance of
exercise and eating right to maintain a healthy body. My personal conceptions of health and the human body may influence my analysis and interpretations of data in this study.
Chapter 2

Literature Review – The Landscape of the Museum and Science Centre

The following chapter seeks to present a historical review of the museum and science centre to its present day form. Since this research was conducted in a museum located in Ontario, Canada, the review focuses predominantly on European and American museums that helped to shape and guide present day Canadian museums. I do however, recognize that museums are important in Eastern and other cultures, and suggest that further iterations of this study could explore *Body Worlds* as it is presented in non-Western locations.

History and Role of the Museum

In classical times, the term *museum* (from the Greek word *mouseion*) referred to a temple dedicated to the Muses, nine goddesses who represented poetry, art, and science, and were inspirational sources for scholars who used them. One of the most famous of the classical museums was founded around 3rd century B.C. in Alexandria. This museum had objects including statues, animal hides, instruments used in medical practice and astronomy, as well as a botanical and zoological park. The museum was primarily used by scholars in residence and was supported by the state (Alexander & Alexander, 2008). The classical *mouseion* and today’s museum share similarities of being places where objects are collected and displayed to assist those around them in making meaning of the world (Pitman, 1999).

During the sixteenth century two new terms were introduced, advancing progress towards the modern day museum. The *gallery*, a long hall with lighting on the side, displayed pictures and sculptures, while the *cabinet*, was a square shaped room filled with
taxidermy, rare botanical samples, small works of art, artefacts, and curios (Alexander & Alexander, 2008). These collections were rarely open to the public, but were instead enjoyed by those in power such as royalty and scholars. During the Renaissance, the term *museum* was used to refer to private collections or “cabinets of curiosity” housing jewels, heirlooms, and other objects that possessed great meaning for their owners. These collections were open only to aristocracy, clergy, and scholars, so that they could gain pleasure from viewing and have an opportunity to learn (Pitman, 1999). The first public museums were established due to the generosity of those willing to share their personal items and wealth in order to enhance learning in the community (Pitman, 1999). These early museums are considered “ancestral form museums” (McManus, 2008, p. 159) as these cabinets of curiosity were the beginnings of the museum.

Museums were publicized in the late seventeenth century with Basel University in Switzerland opening its museum’s doors in 1671. Several years later, the Ashmolean Museum in Oxford, dedicated to natural history, was considered the first science museum in the world (Fernandez & Benlloch, 2000). Intellectuals in the eighteenth century were devoted to understanding natural laws responsible for humanity and the universe and used the museum to preserve natural specimens, works of art, and scientific creations with the hopes of educating humankind (Alexander & Alexander, 2008). The Vatican opened numerous museums in 1750 and the British Museum opened in 1753 with Sir Hans Sloane’s (a physician and collector) natural science collection. Napoleon confiscated objects through his various conquests and displayed them in the Palace of the Louvre. He envisioned the museum to be symbolic of a country’s glory and even though
he was defeated, this idea continued to inspire much of Europe’s museums (Alexander & Alexander, 2008).

As the former British colonies began to merge in North America forming the United States, museums too were evolving, capitalizing on the entrepreneurial value they could bring. These membership-only institutions soon began allowing the public the opportunity to view rare and exotic specimens for a fee (Alexander & Alexander, 2008). The museum was shifting from being inherently personal with objects gathered and collected in a haphazard way to organized and thoughtful displays. Cameron (1971) describes these as democratic museums which showcased the shift from deeply personal exhibits, to public displays holding a number of exhibits simultaneously. The notion was that displays no longer involved the visitor peering into someone else’s prized possessions; instead the exhibitions became the visitors’ collection and as such would become potentially meaningful for the visitor (Cameron, 1971).

In the mid nineteenth century museums could be categorized as public galleries (e.g., part of a library, historical society, university etc.) or dime museums (i.e., commercially driven with entertainment as its primary function) (Pitman, 1999). Phineas Barnum significantly influenced dime museums due to his desire to interest, shock, and entertain the public. In 1841 he purchased collections from a number of museums, collecting 600 000 living and non-living objects including Siamese twins, the Fiji mermaid, and Tom Thumb. Cities around the United States followed suit, and created similar types of museums; “these museums, associated with showmanship, theatricality, and publicity, are redolent in some respects of the ‘blockbuster’ shows of today” (Pitman, 1999, p. 5). Alternatively public galleries focused on educating the immigrant population
through visual narratives - displays encouraging the scientific examination of rows of specimens encased in glass cases (Pitman, 1999). The museum in this century was seen to serve two different purposes: entertainment or education.

By 1900 American museums were predominantly seen as educational centres meant to enhance public understanding, particularly in science. Museums had evolved from being places housing rare and exceptional objects displayed with sensationalism in mind, to places “within… which objects were arranged in a manner calculated to make intelligible a scientific view of the world” (Bennett, 1995, p. 2). This view of the museum mirrored political views describing the importance of an educated public and attaining technological excellence (Alexander & Alexander, 2008). Benjamin Ives Gilman, secretary of the Museum of Fine Arts in Boston, supported this view for science museums, but felt art museums differed: “a museum of science is in essence a school; a museum of art is in essence a temple” (Gilman, 1918, p. 81). Gilman believed that art spoke directly to the viewer and required little labelling. He did however advocate for support to help viewers interpret art pieces. As a result, in 1907 the Boston museum appointed its first docent, a term coined by Gilman to reflect the facilitative nature of these guides (Alexander & Alexander, 2008).

In 1906 the American Association of Museums (AAM) was formed to guide in the development of museum standards and best practices. Its goal was to create an avenue of information sharing and museum advocacy through the creation of a journal. The educational function of the museum was established as the association attempted to forge ties with the National Education Association, which did not come to fruition (Hirzy, 1978). During World War II the AAM advised museums on how to protect their
collections, while postwar its focus turned to amalgamating excess collections, training museum staff, and accruing public support and gifts. In the 1960s the AAM successfully lobbied for museums to be defined by the IRS as an educational organization so that donations would be tax deductible. Accreditation focus was concentrated on upgrading the structures of the organization, reviewing mission statements and operations so that granting agencies could determine sound appropriation of funds. The 1980s saw a shift in focus to collection care and management while accreditation in the 1990s focused on how museums communicated information to the public (Pitman, 1999). Today, the AAM focuses on advocating for the value of museums in society. They seek to “educate and inspire, nourish minds and spirits, and enrich lives,” with one belief seeing the “museum experience… characterized by encounters with real objects and primary learning experiences, in a positive place, supported by scholarship and knowledge” (Bell, 2009, p. 3).

In 1946 the International Council of Museums (ICOM) was established. With 30 000 members from 137 countries and territories from all over the world, like the AAM, ICOM sets design, management, and collection standards and establishes programs to meet the needs of the museum world. In 1977, ICOM began supporting developing countries by training museum staff and restorers. Currently, ICOM is focusing its efforts on fighting illicit trafficking of museum objects, facilitating art and cultural heritage mediation, designing a museums’ emergency programme, and is working to preserve tangible and intangible cultural heritage such as traditions that are passed from generation to generation (International Council Of Museums, 2012).
Museums have long been recognized for their social, economic, and political functions in society and today it is uncommon to find a country without a museum. The mid nineteenth century saw a call for museums to help civilize the population. For example, James Silk Buckingham of England was the first to introduce the idea of government responsibility in creating venues that would help to diminish drunkenness in society (Bennett, 1995). A call for establishments where families could frequent was thought to lead to sobriety and population industriousness (Bennett, 1995).

Today, in the United States it has been estimated that 850 million people visit museums, more than those who visit sporting events (Merritt & Katz, 2009). With such large numbers, the educational role of the museum has expanded beyond just meeting the needs of school children and adult tourists (Hooper-Greenhill, 1999). David Flemming (2005), director of the National Museum in Liverpool, points out that museums are interested in meeting the needs of all visitors as the shift from passive to active learning emerges: “We need to find new connections, new languages, new techniques and, most of all, new attitudes if we are to broaden our relevance and our scope, placing education and learning at the very centre of what we do” (p. 4).

In order to increase the number of visitors to the museum, cafes, gift shops, auditoriums, and interactive displays have been created. The results of these changes have led to the museum being accused of “turning... into Disneyland” (Conn, 2010, p. 4). Tourist attractions have been stereotyped into being places of frivolous fun (entertainment), where limited cultural or historic information is presented or consumed, while museums are seen to be places of high culture where important information is communicated (education) (Hertzman, Anderson & Rowley, 2008). The integration of
some elements located within tourist attractions into museums have led to the term of
*edutainment* being applied to the museum – the idea that visitors will come to the
museum, have fun, and maybe learn something (Conn, 2010). Dr. Alan Friedman,
Executive Director of the New York Hall of Science, distinguishes fundamental
differences between commercial edutainment and edutainment at the museum. First,

> In the [commercial] edutainment industry, education and entertainment are viewed
> as opposite ends of a single continuum. The more education you have, by necessity
> the less entertainment… [the museums] do not regard education and entertainment
> as opposing qualities. The field of play is of two dimensions, not one. (Friedman,
> 1997, p. 1)

A second distinction lies in the experience itself. Friedman (1997) identifies that the
entertainment industry manipulates the consumer (for example in a theme park), but in a
museum the visitor chooses which exhibit to manipulate and for how long. This
autonomy over one’s visit has been termed *free-choice learning* (Falk & Dierking, 2000)
and has altered conceptualizations of what it means to be a learner in a museum setting
(Watermeyer, 2012). More will be said about this later.

Museums have been revitalized, rebuilt and redesigned to add to the life of the
community and to enhance prominence in a city with 4-5 billion dollars spent on museum
construction in America alone in the decade leading up to 1998 (Conn, 2010).
Economically, travel and tourism increases as many museums receive ‘facelifts.’ For
example, The Royal Ontario Museum in Toronto selected Daniel Libeskind from Berlin,
Germany to design an “educational and cultural resource for the people of Ontario and…
visitors from across Canada and around the world” (Royal Ontario Museum, 2002, para.
2), making it a central location to visit. In Detroit, participants were asked to rate the importance of institutions in their city, and whether they had visited the establishment. The Museum of African American History was deemed to be of high importance even though the majority of participants had not visited (Gurian, 1999). People thus do not have to use the museum to see the importance of spending their taxes on a place that houses cultural and informational works (Gurian, 1999). Visionaries believe that great cities and countries are defined by great cultural institutions, and as such, museums have become sites of great transformations. They have become “cultural, educational and civic centers in our communities” (Pitman, 1999, p. 1).

As seen throughout history, museums transformed from being places experienced only by invited aristocrats to inclusion of the general public. This transformation stemmed from criticism of elitism; the portrayal of museums as a place of high culture, only available to upper class people (Conn, 2010). “Reinventing the museum symbolizes the general movement of dismantling the museum as an ivory tower of exclusivity and toward the construction of a more socially responsive cultural institution in service to the public” (Anderson, 2004, p.1). Critics argued that the museum alienated particular ethnicities and races (Conn, 2010). Furthermore,

Exclusion of minority groups from the political, economic and social dimensions of society is reflected in the museum which fails to tell the stories of those groups and denies them access to its services through mechanisms of exclusion (non-representation within collections and displays, selective promotional targeting, admission charges). (Sandell, 2000, p. 408)
Thus in an increasingly diverse society, the museum strives to prepare exhibitions of contemporary relevance with the intent of becoming agents of social inclusion (Conn, 2010; Sandell, 2000). However, Conn (2010) warns that “to ask museums to solve our political and economic problems is to set them up for inevitable failure and to set us up for inevitable disappointment” (p. 17).

Moving into the 21st century museums are challenged with balancing education, entertainment and social responsibility. With an increasingly diverse population, communities will require enhanced abilities to “promote integration and develop understanding across cultures” (Merritt, 2008, p. 4). Museums have the potential to become places of cultural exchange within a community and to promote social change. They are “no longer monolithic institutions of the past” but are instead striving to tell stories that reflect current issues and marginalized people (Janes & Conaty, 2005, p. 3).

With the re-conceptualization of the museum learner as an individual with a variety of prior experiences and learning needs, a move towards a constructivist learning approach in the museum has the potential to engage, sustain, and support all visitors’ needs (Hein, 1998; Watermeyer, 2012). Hein (1998) describes how research supports the idea that exposure to phenomena results in a variety of constructed conclusions among people. By adopting a constructivist approach, museum staff “acknowledge that exhibition-making is not displaying truth, but interpretation” (p.177). Hein (1998) argues that to truly create a constructivist museum exhibition, researchers must “…pursue aggressively the study of how visitors make meaning in the museum” (p.177). In continuing to pursue visitor studies to the museum, a deeper understanding of how exhibition design may support individual constructed meaning may result.
History and Role of the Science Centre

Bennet (1995) argues that museums realized their educational potential by developing ordered and thoughtful displays rather than housing cabinets of curiosity. This shift continued as science centres transformed into its present day form through four stages of development moving from the *ancestral form* of cabinets of curiosity, to *first generation*, followed by *second generation*, and finally *third generation* museums (Freidman, 2010; McManus, 1992). Some contemporary science centres are third generation museums, however, others incorporate characteristics from different generations as well (McManus, 1992).

*First generation* museums became subject based collections that brought order to the cabinets of curiosity specific to ancestral forms of the museum (McManus, 1992). For example, human technological inventions were first purposefully presented at the world’s fair in the nineteenth century following the industrial revolution, leading to the birth of science and technology museums (Alexander & Alexander, 2008). First generation museums also include technological collections which began in the 19th century (Freidman, 2010). First generation museums had strong ties with academic disciplines in universities as they set out to educate the public and contribute to scientific knowledge (McManus, 1992). Examples of first generation museums include natural history museums, such as The British Museum (founded in 1753) and The Musee Nationale d’Histoire Naturelle (founded in 1793), which showcased instruments used in scientific research (McManus, 1992).

One popular first generation science and technology museum was the Philadelphia Centennial Exposition of 1876 which dedicated five buildings to presenting
industrial exhibitions. Science museums of this time were focused on displaying technological and scientific innovations through the use of objects as collections – the process of science was lacking from displays. Thomas Wright (1991) reflected on the reason why little science was displayed in science museums identifying: “The fundamental essence of a museum that sets it apart from any other type of institution is its interest in acquiring artefacts to mark the passage of time” (p.1). Many Western science museums were originally storehouses of objects that resulted in the presentation of technology or industry, and not science itself (Baldock, 1995). In these original science museums, the focus was on presentation of the past, illustrating historic technical achievements rather than scientific ideas or theories (Baldock, 1995). Janousek (2000) describes these early museums as ‘first generation museums’ which focused on displaying objects and artefacts without being placed in their broader contexts.

In the early part of the twentieth century, science museums struggled to be both an educational centre and a research centre. When Albert Parr was appointed to the American Museum of Natural History (AMNH), he began examining the role of the museum in public education, exhibition design, and research. With the AMNH resuming financial stability after the war, Parr began advocating for the design of exhibitions that demonstrated the connections between human beings and the natural world, as opposed to the traditional display methods by classification (Conn, 2010). He began to advocate for the educational role of the science museum instead of a research commitment. At a conference in Buffalo in 1953 he claimed, “I don’t think research in itself, other than identification, is essential to a museum. To say there can’t be education without research would be to condemn most school systems. A science teacher can be excellent without
being a research scientist” (Conn, 2010, p. 146). Nearing the end of the 20th century, the AMNH had transitioned from its traditional way of portraying natural history to becoming a public institution with its primary role of contributing to science education rather than research (Conn, 2010).

*Second generation museums* became training centres for universities and industries; places of authoritative sources of information in the area of science (McManus, 1992). For example, in 1794 the Conservatoire National des Arts et Metiers opened in Paris, showcasing artefacts made from the factory and the craftsman’s workbench, which were used as craftsman teaching aids (McManus, 1992). In addition, second generation museums served to promote “the world of work and scientific advance” (McManus, 1992, p. 162) and included goals of training, collection, conservation and research. Evolving from the fun fair, second generation museums began including artefacts to be manipulated by the visitor as they displayed science and technological progress in an entertaining way (Freidman, 2010; McManus, 1992). A goal of second generation museums became public education rather than research.

Following WWII and the launch of Sputnik, teaching and learning about science and technology increased significantly (Pitman, 1999). In the 20th century the *third generation* science-technology centres emerged, with The Exploratorium in San Francisco and the Ontario Science Centre in Toronto moving away from historical collections, and towards a ‘hands-on’ approach to learning science (Beetlestone, Johnson, Quin, & White, 1998; Freidman). Science centres became less about collections and more about creating engaging hands-on experiences whereby the public can learn about scientific principles through interaction (Quin, 1994). “These museums and science
centres are concerned with the transmission of scientific ideas and concepts rather than the contemplation of scientific objects of the history of scientific developments” (McManus, 1992, p. 163). The objective is education through a ‘game’ approach, communicating to visitors through ‘participation’ and, in this way, making the transition from ‘objects’ to ‘processes’ (Janousek, 2000, p. 23). The hands-on, interactive approach is “championed by their advocates, as circumventing the didactic or prescriptive characteristics of conventional forms of transmission pedagogy; which visitors find off-putting…” (Watermeyer, 2012, p. 2). Instead, visitors can play and experiment with exhibits to generate their own personalized meaning (Watermeyer, 2012). But, this approach is not without issue. First, the focus on ideas instead of objects may produce self-contained exhibitions with little connection to the real-world and second, the emphasis on enjoyment may undermine the learning potential of the science museum (Rennie & McClafferty, 1996).

McManus (1992) identifies two strands of third generation museums. The first strand of third generation museums “is the science centre, in which decontextualized scattering of interactive exhibits, which can be thought of as exploring stations or ideas…is presented in a small centre or in a gallery in a traditional museum” (McManus, 1992, p. 164). The second is a “non-object based thematic exhibition, with interactive exhibits…such exhibitions are often concerned with the larger concepts of science which are likely to arouse a personal response” (p. 163-164). These thematic exhibitions seem to include a shifted focus to the contemporary rather than the historic and gradual evolution towards social responsibility encouraging visitors to consider science, technology, society, and environmental issues. This shift aligns with Pedretti’s (2002) work that
describes the transition of science exhibitions to allowing visitors to explore scientific phenomena while simultaneously being confronted with socio-scientific issues (e.g., use of genetically modified organisms, reproductive technology, cloning). These issues-based exhibitions promote critical thinking of scientific content in light of a social context.

Today, few first generation and many second generation museums exist, with many incorporating elements of the hands-on third generation museum. As science museums evolve, its goals and shifts reflect science centres’ expanding ideas about what it means to educate the public to promote scientifically literate citizens.

**Scientific Literacy and the Science Centre**

Science and technology is ever evolving, requiring a lifelong commitment to remain informed of trends and new findings (Falk, 2001). Supporting this commitment, science centres play an important role in educational infrastructure; that which “lies beneath the surface and provides critically important support to a wide range of economic and social activities” (St. John & Perry, 1993, p. 60). Science-rich institutions provide one opportunity to support national goals of promoting scientific literacy as science education is not a singular, linear process involving only the classroom or informal learning experiences (Falk, 2001).

It can be argued that the promotion of scientific literacy lies at the heart of formal and informal education (Henriksen & Froyland, 2000; Lucas, 1983; Pedretti, 2002). For example, the Pan Canadian Protocol for Collaboration on School Curriculum, adopted by the Council of Ministers of Education in 1995, led to the Common Framework of science learning outcomes for K-12 in 1997. Integral to formal science school curriculum across
Canada is promoting scientific and technological literacy for students by providing opportunities for them to:

1. relate science and technology to society and the environment (STSE connections)
2. develop the skills, strategies, and habits of mind required for scientific inquiry and technological problem solving
3. understand the basic concepts of science and technology

(Ontario Ministry of Education, 2007, p. 4)

Furthermore, scientifically literate people are able to read and understand media reports about science, evaluate them, and capably engage in discussion and decision making surrounding the topic (Science Teachers’ Association of Ontario, 2006). Experiences that offer the opportunity to develop an understanding of the nature of science, and forge connections between science, technology, society and the environment is critical to promoting a scientifically literate person (Ontario Ministry of Education, 2007).

In 2008, leaders from science centres and museums from 51 countries met in Toronto, Canada for the 5th annual Science Centre World Congress. They identified a collective statement of beliefs and commitment to promoting scientific literacy for all of their patrons. They identified the role that the science centre plays in promoting scientific literacy for all:

In 2008, science literacy is as important as other forms of literacy and numeracy… Science centres can be a powerful force for good. Children who attend our science centres are growing up in a rapidly changing world and can become critical “agents of change” so that everyone can have a better future. Teens and university students who participate in science centre programs are
tomorrow’s leaders and decision makers. Adults who visit our centres and get involved re-engage with science and become better positioned to understand the context of scientific discoveries and contribute to dialogue on topics such as climate change, human health, the need for renewable energies, water shortages and HIV/AIDS.

(Fifth Science Centre World Congress, 2008, p. 1)

Scientific literacy is a complex construct and has become a slogan of sorts with many diverse meanings and goals. Positioning the term ‘scientific literacy’ is helpful in trying to understand the visitor experience while in a museum. Shen (1975) distinguishes between three different scientific literacies: practical, civic, and cultural. Practical scientific literacy is the ability to use scientific knowledge to solve practical problems. “By practical scientific literacy, I mean the possession of the type of scientific and technical know-how that can be immediately put to use to help improve living standards” (Shen, 1975, p. 265). Here, Shen (1975) views practical scientific literacy to involve the dissemination of essential scientific information that can support the public in solving practical problems.

Civic scientific literacy enhances awareness of ‘science-related public issues’ (e.g., health, energy, food and agriculture, environment etc.) and allows decisions to be made in a democratic manner:

The aim of civic science literacy is to enable the citizen to become more aware of science and science-related issues so that he and his representatives can bring their common sense to bear upon them and, in this way, participate more fully in the
democratic processes of an increasingly technological society. (Shen, 1975, p. 266)

The goal, according to Shen (1975), is to encourage citizens to look at facts, consider multiple perspectives, and evaluate risk and benefit in order to make informed and responsible decisions about science-related issues. The use of science-related issues in curriculum programming (and science centre exhibition programming) can help support the development of a civic scientifically literate population (Henriksen and Froyland, 2000; Lucas, 1983). More will be said about this when I discuss controversial issues-based exhibitions.

Culturally scientific literate people are motivated to know about and celebrate human achievement in science (Shen, 1975). The cultural literacy perspective recognizes science as a major cultural achievement of the human spirit and suggests that science is intrinsically interesting, exciting and intellectually stimulating. The combination of all three forms of science literacy are necessary “not only for intellectual enjoyment but also as an important service to society” (Shen, 1975, p. 368).

Furthering Shen’s (1975) identification of the three scientific literacies, Henriksen and Froyland (2000) describe four arguments to support creating opportunities to promote scientific literacy: 1. The practical argument: people need an understanding of science and technology to function in an increasingly science and technology dominate society; 2. The democratic (civic argument): people need to understand science as it relates to current issues that affect their democratic society; 3. The cultural argument: people need to understand the science that influences our culture, and knowing about this science brings implicit joy to the learner; and finally an additional point 4. The economic
(professional) argument: a scientifically literate workforce is necessary for a profitable economy. Lucas (1983) states that the majority of museums contribute to cultural scientific literacy, however, the ‘new generation’ museums identified by Pedretti (2002) which use socio-scientific issues as the basis for their exhibitions, move beyond this singular literacy, and instead contribute more broadly to scientific literacy. More will be said about this later.

Hodson (1998) describes a comprehensive view of scientific literacy that involves the person fully participating in science. He sees scientific literacy as incorporating: 1. ‘learning’ science (acquiring conceptual understanding) 2. ‘doing’ science (engaging in the process of inquiry and problem solving) and 3. ‘learning about’ science (developing an understanding of the nature of science and interactions among science, technology, society, and the environment). Kolsto (2001) argues that learning about science should include opportunities to explore learning about the social process of science, limitations in science, values in science, and the critical attitude required by scientists. He posits that a functional democratic society requires people to capably make decisions about critical socio-scientific issues they are confronted with and so, people must be provided with the tools to examine scientific knowledge and make informed decisions taking validity and trustworthiness into account (Kolsto, 2001). Therefore, while scientific knowledge is important, ‘doing’ science and ‘learning about science’ are equally important in the process of developing a scientifically literate person.

Such comprehensive views of scientific literacy are useful in helping understand the complex and multiple roles of science centres, and the visitor experience. Historically, science centres have been the purveyors of scientific knowledge, providing the public
with access to scientific knowledge. For example, Falk, Brooks and Amin (2001) conducted telephone interviews of the general public in the Los Angeles area in order to understand public perceptions of sources of scientific and technological knowledge. Participants were asked to rank sources they relied on for scientific information and museums were ranked overall fifth behind, school, books, life experience and TV. More recently, Griffiths (2007) conducted telephone interviews and found that 67% of the population in the United States has visited the museum via the internet and in person. The public visits to the science centre suggest it as a place in which the general public may go to learn science. However, more recent installations and science centre missions reflect a broader view of scientific literacy. By creating diverse exhibitions including hands-on, phenomenon based, and issues-based, visitors have the opportunity to do science, while simultaneously learning science and learning about science.

According to the National Survey of Science and Mathematics, science education centres serve approximately 150 000 American school teachers through special events, workshops and internships (St. John, Dickey, Hirabayashi, & Huntwork, 1997). In light of the large number of teachers that partake in these in-services, it is likely that many take their classes to visit as well. The AAM found that the median annual attendance at science centres in the United States is 357 103 visitors per science centre; the highest of all of the types of museums (Merritt & Katz, 2009). The science centre may thus potentially engage a vast number of people in science education through their programming. Understanding the visitor experience at these centres will assist programs to provide optimal learning experiences for their patrons, and hopefully promote scientific literacy in its broadest form.
Representations of Science in Exhibitions

Museums have often been associated with being encyclopaedias of knowledge and storehouses of objects (Conn, 2010). Objects define a museum, and owning the “real thing” is what makes museums unique (Gurian, 1999). Museums are the natural extension of collecting, categorizing, and cataloguing objects, where they are built for displaying purposes (Conn, 2010). The role of objects however, in some museums has changed from the 19th to 20th century (Conn, 2010): “As education and interpretation became important purposes of the museum, better display methods were imperative to tell the story. Storytelling… became the heart of the exhibition” (Alexander, 1960, p. 178). Collections began being rearranged with a focus on “representativeness rather than that of rarity” (Bennett, 1995, p. 39). With storytelling becoming a priority, fewer objects strategically placed with enhanced showmanship, appealed to a wider audience (Alexander, 1960). Accompanying text or docents helped to facilitate the interpretation of objects (Conn, 2010).

Science exhibitions have changed over the years from displaying objects interpreted by scholars to using objects to promote public understanding of underlying scientific concepts (Rennie & Williams, 2006). Over time, the AAM has expanded its definition of museums to include institutions that not only own objects, but also care for, display and preserve objects (e.g. galleries). Science centres and children’s museums present further unique visitor experiences as they use exhibit material specifically built to demonstrate an activity. In 1978, the AAM identified three non-collection based institutions: art centres, science and technology centres, and planetariums, and deemed them to be museums. The definition of the museum expanded to include objects suitable
for collection, as well as objects built for the museum itself (Gurian, 1999). Most science centres do not have collections of objects, but instead rely on replicas or constructed models to relay their stories and allow visitors to experience phenomena (Virginia Association of Museums, 2008). Thus, in order to represent science, both collection based objects and unique objects built to demonstrate a phenomenon have been used: “knowledge is given shape through the use of objects and exhibitions” (Conn, 2010, p.5).

Museum exhibitions have been classified into two categories: experiential and pedagogical (Wellington, 1998). Experiential exhibitions offer visitors the opportunity to engage in hands-on activity with a phenomenon, while pedagogical exhibitions specifically set out to teach something (Wellington, 1998). More recently Pedretti (2004), building on the notion of scientific literacy espoused by researchers such as Hodson (1998) and Shen (1975) introduced a third type of exhibition - critical exhibitions (Pedretti, 2004). Critical exhibitions are identified by Pedretti (2004) as those that evoke critical thought by presenting issues-based subjects (which are often controversial) that allow visitors to learn about science. These exhibitions invite the visitor to consider multiple perspectives, and are often emotionally and politically charged.

Lucas (1983) argues that most long term exhibitions contribute to cultural scientific literacy, however, issues-based exhibitions as defined by Pedretti (2004) move beyond this singular literacy. For example, a critical exhibition at the Ontario Science Centre, A Question of Truth encourages visitors to “learn about science, that is, the social, cultural and political contexts in which science exists” (Pedretti, Macdonald, Gitari, McLaughlin, 2001, p. 413), satisfying Hodson’s (1998) and Kolsto’s (2001) criteria for an expanded view of scientific literacy. Similarly, an exhibition about AIDS “saw people
using the exhibit to deal with tough issues in their lives” (Cooks, 1999, p. 20), contributing to practical and civic scientific literacy. When visitors are confronted with issues-based exhibitions, which are often surrounded by controversy, rather than a series of uncontestable facts, “a different kind of intellectual and emotional response” (Pedretti, 2002, p. 16) emerges, moving beyond the cultural literacy fostered by traditional museum exhibitions (Lucas, 1983; Henriksen & Froyland, 2000). While literature describes the potential for visitors to science centres to dislike open ended, value laden or unresolved questions, Pedretti et al.’s (2001) work found that visitors to this particular exhibition appreciated and supported this novel way of representing science.

Visitors to the museum bring with them a plethora of experiences and opinions, which prompted Mintz (2005) and Solomon (1994) to explore how to make issues-based exhibitions in a museum work. Solomon (1994) identifies that issues-based exhibitions require a topic that the public can relate to, is worthwhile, and presents multiple views of the issue. Mintz (2005) suggests that issues-based exhibitions positively contribute to critical thinking skills, offer valuable information (particularly relating science and technology to the real world), and encourage visitors to monitor and evaluate their own feelings towards scientific issues. Cooks (1999) describes the exhibition What About AIDS? and identifies steps taken to successfully create this controversial exhibition. First, she suggests there must be strong foundational beliefs for creating the exhibition, and this must be followed with preparing museum staff for the exhibition through education. Community involvement in creating the exhibition ensures it is complete and accessible. Next, holding a preview may allow potential criticism and biases to emerge which may lead to change or reinforcement in exhibition design. Finally sharing the process of
exhibition design with other institutions offers the opportunity to learn from mistakes and successes (Cooks, 1999). While challenges exist when creating issues-based exhibitions (e.g., issues are rarely phenomenon based and so are difficult to make hands-on, science exhibitions are random access, science centres rarely have consistent staff presence, and issues are often multilayered heavily depending on text), the value they impart is significant (Mintz, 2005).

Science museums continue to find ways to engage the public as they evolve from traditional curiosity cabinets that present a mixed array of objects, to ordered collections representing technological innovations, to hands-on interactive displays, and recently to issues-based exhibitions. Further, with information and communication technology advancing, museums attempt to infuse this technology into their exhibitions where possible. For example, Baldock (1995) describes planning a new exhibition incorporating the nature of science at the Birmingham museum, with a focus on process rather than the product (objects) normally on display in museums. The Current Science & Technology Center (CS&T) at the Museum of Science in Boston intends to keep visitors updated on current issues in science and technology by incorporating a variety of modalities of learning into display i.e., using live presentations, interactive touchscreens, weekly television broadcasts, exhibitions and a website that presents podcasts and videocasts. In order to ensure topic presentations are current, CS&T has developed relationships with science journals that offer the centre advanced access to articles prior to publication (Davis, 2004). This leads to presentations that align with the release date of the articles. Also, being in the heart of Boston enables strong connections with local scientists at universities and hospitals. In this way, CS&T is a bridge between scientists and the
media, offering the public the opportunity to learn about science as it happens (Davis, 2004).

In an increasingly digital world, museums feel pressure to incorporate information technology into their exhibits. In 2006, a large percentage of museum visits occurred remotely with many visitors accessing the museum via the web (Merritt, 2008). This led exhibition designers to question how information technology can be integrated into exhibits and whether entire exhibitions can be digitized. But, as Merritt (2008) argues, humans have always been obsessed with the real and tangible. She eloquently articulates:

The prevalence of the digital, virtual world raises public awareness of the increasingly rare world of non-digital assets that help tell the story of how humans got where we are. Museums play a more critical role than ever as purveyors of the authentic, addressing a human desire for the real as the wonders of technology march us towards the opposite path. (Merritt, 2008, p. 15)

The *Body Worlds* exhibition is a unique exhibition as it does not incorporate the interactive and hands-on approach typical of science centres. Instead, most objects are on display in glass cases, strongly resembling the traditional display approach of museums. The exhibition may be considered pedagogical as it sets out to teach visitors about the human body, however, the medium used to present the subject is controversial. A limited amount of technology is used throughout the exhibition, however, the underlying technology used to make plastinates is advanced. While *Body Worlds* could certainly be presented digitally, the question remains whether the viewer would have the same reaction as viewing a real human cadaver. The use of cadavers in display may have educational value, however, other messages could arise as well.
Politics and Power in Display

Regardless of the way science is represented in museums and centres, what remains common is that museums are sites for explicit and implicit learning, and convey implicit and explicit messages. Exhibition design is created with intended goals, however, in the process unintended or hidden messages may also be present which hold powerful unspoken messages (Vallance, 2004). Exhibition designers often have an underlying social commentary reflected in their designs that may serve to reinforce normative structures in society. These commentaries may be intended and unintended, as the production of exhibition design is inherently political (Cameron, 1971; Leupken, 2011; Macdonald, 1998). Consequently, visitors receive and decode both overt and covert messages as they move through exhibitions.

Museums are inherently powerful, and as such this power is transferred to the objects on display. Viewing objects through a shop window allows for honest judgment whereas “once it [the object] is in the museum, we make our judgment in the knowledge, if not awe, of the fact that the experts have already said ‘This is good,’ or ‘This is important…’ The object has been enshrined” (Cameron, 1971, p. 70). The process of turning an object into a museum object is inherently political. It requires acquiring the object, implying that someone has deemed it worthy of being saved, restored, and protected (Luepken, 2011). This is followed by incorporating it into a collection with a classification system and in doing so, the object becomes a part of the museum’s culture, a process which “involves the peril of disregard the original meaning of the object” (Luepken, 2011, p. 159). Finally, the object must be displayed; “the positioning,
description, context information all construct the subject matter that influences the perception of the object” (Luepken, 2011, p. 160).

A politically charged museum exhibition that never came to fruition was centred on presenting the object: Enola Gay – the B-29 Superfortress bomber that dropped the atomic bomb on Hiroshima. The Smithsonian Institution in Washington, D.C. intended to present the bomber in its context of the Second World War, revisiting America’s justification for dropping the bomb, as well as presenting the stories, artifacts and photos of victims (Pedretti, 2002). Veterans disagreed with the representation and “accusations about lack of balance, truth, objectivity, distinctive ideological tilts, misrepresentations and privileged perspectives were hurled against the installation design” (Pedretti, 2002, p. 15). Consequently, the Enola Gay exhibition was cancelled and the director of the Air and Space Museum was forced to resign. This inherently political exhibition was not able to satisfy all stakeholders even though contradictory purposes for the exhibit were often reported:

The curators were defeated principally by their own scripts, which revealed exactly what they were planning to do. They said one thing in public and a different thing in private. Incredibly, they were prone to putting their real views into papers, which were duly obtained and circulated by AFA.

(Air Force Association, 2004, p. 29)

In 1995, the exhibition was abandoned, and instead the aircraft is displayed at the Smithsonian without context, leaving the intended and unintended messages of curators divorced from this display.
With the introduction of democratic museums came the expectation that collections would be “presented and interpreted … in some way... consistent with the values of its society” (Cameron, 1971, p. 66). Curators however, were educated middle to upper class individuals creating collections consistent with their own values and priorities. Museums became temples in which objects that were held in high esteem could be viewed as objective reality accepted by society: the museum became “closer in function to the church than … to the school” (Cameron, 1971, p. 66). Thus museum reform, according to Cameron (1971) was encouraged to see museums as being temple and forum. The forum would become a place for experimentation and innovation, a place where process was demonstrated, while the temple would showcase the product: “In the presence of the forum the museum serves as a temple, accepting and incorporating the manifestations of change… the museum must build collections that will tell us tomorrow who we are and how we got there” (Cameron, 1971, p.73).

In order to create museum reform, Cameron (1971) suggested that selection, creation, and interpretation of exhibits by curators be done objectively (Cameron, 1971). As Macdonald (1998) notes, the final presentation of an exhibition does not portray the process of decision making i.e., the “assumptions, rationales, compromises and accidents” that led to the final product (p. 2). Instead the exhibition is portrayed as scientific fact while inherent in the process and decisions lay the potential for subtle messages. Cameron (1971) recommends that the classification systems held by museums move away from the “undecipherable code for the majority of museum visitors, [and] must either be replaced, or better, be supplemented by interpretation of the collections that is based on the probable experience and awareness of the museum audience” (p. 67).
He asserts that exhibitions should be designed with their original context in mind, yet should relate to contemporary society so as to reflect the experiences of the visitor (Cameron, 1971). Not doing so leads to misrepresentation and can encourage negative views of other cultures (Cameron, 1971) and may serve to reinforce (or in positive instances deconstruct) societal norms. The museum is not neutral; it delivers messages and makes arguments (Starn, 2005). Some messages resulting from exhibition design may lead to empowering some visitors while simultaneously demoralizing others. Bennett (1995) describes the importance of examining links between exhibition design and consumption: “This is to suggest that, in addition to what gets shown in museums, attention needs also to be paid to the process of showing, who takes part in those processes and their consequences for the relations they establish between the museum and the visitor” (p. 103).

Science is often portrayed to the public as holding absolute truths. It is viewed as authoritative, objective, reliable, and powerful; void of social, cultural, or political complications (Hodson, 1998). The power afforded to science stems, in part, from the notion that knowledge is power, and power is involved in the construction and consumption of knowledge (Foucault, 1979). Similarly, science centres are viewed as places of cultural authority and power, holding exhibitions that according to Macdonald, (1998) “educated people ought to know about” (p. 2). Macdonald (1998) continues by arguing that “museum exhibitions are agencies for defining scientific knowledge for the public, and for harnessing science and technology to tell culturally authoritative stories about race, nation, progress and modernity” (p. 19). Consequently, important questions begin to emerge: Who is empowered or disempowered by certain displays? How does the
content and style of an exhibition inform public understanding? What are the politics of consumption (i.e., visitor decoding and interpretation)? What covert messages do visitors take away? The next section specifically examines the Body Worlds exhibition describing its controversial and ethical dimensions in the context of power and politics.

**Controversial Issues**

Recall from the earlier section that civic scientific literacy entails observing and evaluating multiple perspectives, considering moral and ethical concerns, and making informed and responsible decision regarding a science-related issue (Shen, 1975). One way to support the development of civic scientific literacy is through the presentation of controversial issues at the museum. Researchers often examine scientific controversies as they “summon different agents; they allow the analysis of the construction and deconstruction of facts and theories; they draw attention to the social processes of science and how its elements are confronted, negotiated, transformed, tested, rejected, recuperated and debated” (Delicado, 2009 p. 760). Scientific controversies include a plethora of disagreements that stimulate critical thought around: social, moral or religious implications of a scientific theory or research practice; tensions between individual needs compared to the communal priorities (e.g., around environmental, political, economic issues); concern over health hazards caused by industry; and patents, intellectual property or scientific fraud, to name a few (Nelkin, 1995). Scientific controversies often involve “struggle over meaning and morality, over the distribution of resources, and over the locus of power and control” (Nelkin, 1995, p. 445).

Oulton, Dillon, and Grace (2004) state that an issue may be controversial when people differ in opinion and position, with no agreed upon outcome: “By controversial
we mean that significant numbers of people argue about them without reaching a conclusion” (p. 411). They suggest that a controversial issue can stem from differences in religious, cultural or moral beliefs and the attitudes towards the controversial issue will be mostly based on value judgments. Hess and Avery (2008, p. 510) suggest that:

Issues are not controversial by nature, but are socially constructed in ways that cause them to be more or less controversial. This is why it is common for issues that are considered well settled in one nation (or even part of a nation) to be controversial in others.

Throughout Oulton et al.’s (2004) article, ‘controversial’ is often used as an adjective to describe the noun ‘issue.’ However, the word ‘controversy’ is often used to replace ‘controversial issue.’ Oulton et al. use the words controversial issue and controversy interchangeably.

According to Mazda (2004) museums should present controversial issues. Public interest with these issues leads to enhanced engagement with the exhibition. Presenting controversial issues relevant to the general public allows for the “contribution to a more scientifically informed discussion about public issues” (Bodmer, 1985, p. 28). Exhibiting controversial issues in the museum may thus contribute to the development of civic scientific literacy as the public is exposed to multiple perspectives and can appraise these in light of scientific information.

Issues have often been used to teach science and teach about science (Aikenhead, 1985; Hodson, 1990; Pedretti, 2004; Zeidler & Sadler, 2008). Pedretti (2004) describes how issues in critical museum exhibitions allow visitors to “critically explore the nature of science (NOS) and the relationship among science, technology, society and the
environment” (p. 36). Issues create possibilities for students to explore the intersections across science and society, and to engage with the messiness of science that stems from social, political, ethical, and historical factors. The use of controversial issues in education has been studied by Hess and Avery (2008). They conclude that:

There is a relationship between issues discussions and many democratic outcomes… As both a form and goal of democratic education, issues discussions are one means of creating a more enlightened and engaged citizenry. We know much about how skilled teachers use issues discussions in their classrooms, and how such discussions benefit young people. Unfortunately, we also know that in-depth issues discussions are not commonplace. Such a state fails our youth, and ultimately, our democracies. (p. 515-516)

Similarly, the use and presentation of issues in the museum may have the potential to contribute to civic scientific literacy and ultimately democratic outcomes.

In this thesis, I adopt the term controversial issues and controversy as a way of making sense of the visitor experience with Body Worlds. I discuss the controversial issues inherent in Body Worlds and how they play out in visitor meaning-making. The provocative nature of this display elicits responses that are influenced by one’s religious, cultural or moral beliefs, and as such, Oulton et al.’s (2004) definition of controversial issue is best suited when describing the controversial nature of this display.

**Body Worlds: A Controversial Issues-Based Exhibition**

Von Hagens’ *Body Worlds* is a traveling exhibition that, to date has had over 34 million visitors in 45 cities around the world. The use of plastinated human cadavers allows the layperson to experience what would otherwise only be experienced by medical
professionals. Initially much debate arose over the ethical dimensions of this exhibition in relation to body donation and how the bodies were displayed. Ascribing to Oulton et al.’s (2004) definition of controversial, presenting plastinated cadavers to the public may create value laden conflict for some stemming from differences in religious, cultural or moral beliefs and the attitudes towards the issue will be mostly based on value judgments. The controversial issues located within Body Worlds will be described in more detail below.

As time passes, the Body Worlds exhibition is less contested; public outcry and protest does not accompany it as much as it moves to its new locations. Supporters for Body Worlds emphasize the educational potential of the exhibition as it contains many human specimens which confront visitors with consequences of unhealthy behaviours such as smoking or poor diet and exercise habits. As a result, Body Worlds is claimed to enhance health awareness and promote a healthy lifestyle for the public (vom Lehn, 2006). Von Hagens asserts that the information presented by the exhibition and experience with plastinates may break down barriers between the lay public and the medical profession as individuals who are educated and well versed in their illness can communicate effectively with their doctors (vom Lehn, 2006). While Body Worlds offers the public the opportunity to gain insight into diseases that they or someone they know may have experienced, some people vehemently choose not to attend.

When Body Worlds first entered into the public realm, ethical questions arose and people openly contested von Hagens’ work. Questions surrounding body procurement and consent confronted the exhibit. Prior to being brought to North America, Dr. Hans-Martin Sass a bioethicist from Georgetown University in Washington D.C. examined the
cadaver obtainment process. He matched every donation form with death certificates and noted that von Hagens’ body donation process contained information in excess of normal body donation consents and were easy to understand (Moore & Brown, 2007). He concluded that informed consent was indeed obtained. Preub (2008) argued that while donors’ informed consent is received, and coercion for monetary reasons does not exist, this may not be enough. He questioned whether informed consent should include the pose the individual will be placed in, and the way the body will be displayed (whole vs slice). While individuals donating today are likely familiar with von Hagens’ work, those that initially signed up may not have been. Early donors likely may not have envisioned a copulating couple or gestalt plastinates (those that are separated, folded up, divided, opened up). While it may be argued that early bodies could be removed from displays, or discarded altogether, this could also serve to contradict the donors’ wishes. Hence, even though body donation was obtained through informed consent, other factors still need to be considered in order to ensure all ethical dimensions of body donation are met.

The various poses that are found in Body Worlds may be considered controversial as they raise questions related to preserving the dignity of the dead. Some plastinates emulate everyday human activities, such as playing chess or skating, and hold various props that serve to create “dynamic sculptures” (Burns, 2007). Other plastinates, like the gestalts, are more surreal with their bodies opened like a chest of drawers or a plastinate holding its own skin. The artistry is further reinforced by placards holding von Hagens’ signature, name of the piece, and date of creation (Burns, 2007). Some of the poses have been expressed to resemble drawings by famous anatomists from the Renaissance period through to the nineteenth century (Moore & Brown, 2007). This point could serve to
support the assertion that von Hagens is attempting to portray his plastinates as the historical medical community intended them to be, however, the number of these poses are minimal and his use of props, and gestalt and modern positions overshadow this portrayal. Von Hagens (2005) himself identifies that there is an artistic element to his design, but maintains that aesthetically pleasing plastinate poses serve to enhance the educational value of the display. He defends the usefulness of poses in that they do not induce feelings of mourning in the observer, as this would prohibit them from learning.

In May of 2009, von Hagens debuted a copulating couple in Berlin. This raised public outcry whereby some politicians and members of the public thought that von Hagens had gone too far (Reuters, 2009). A conservative Member of Parliament specializing in cultural affairs called the display “revolting,” and Dr. Hibbs a professor of Ethics and Culture at Baylor University went on record describing the plastinates as “pornography of the dead human body” (Moore & Brown, 2007, p. 232). Von Hagens defended himself claiming that the couple showed the act of sexual intercourse in “bracing clarity,” and reminded the public that two thirds of body donors consent to being showcased engaged in a sexual act (American Free Press, 2009; Reuters, 2009). Even though von Hagens defends this particular plastinate, the copulating couple has not been brought to Canada. The discussion and debate surrounding the positioning of the human cadavers in the display make this a controversial issue.

Von Hagens has often been criticized for the high price of admission to attend the Body Worlds exhibition. It has been argued that von Hagens’ exploitation of the human body has been financially motivated (Moore & Brown, 2007). However, a non-profit museum or university could not support the immense collection continuously being
produced by the Institute for Plastination (IfP) (Moore & Brown, 2007). Each year, the IfP makes approximately 1000 single individual specimens, and 15 whole body plastinates each of which takes 1500 man hours to create (Walter, 2004a). Altogether, the Institute employs about 400 individuals. Most of the money that von Hagens makes is re-invested into his company due to his obsession with plastination (Wetz, 2005). In a survey of visitors to the Munich Body Worlds in 2003, approximately 25% of respondents thought that the cost of admission was to predominantly serve the personal business interest of the Institute, while the remaining 75% did not agree with this statement (Leiberich, Loew, Tritt, Lahmann & Nickel, 2006). Exploitation of the dead for monetary gain would be considered a controversial issue, however, millions of visitors continue to pay the high price of admission to attend this exhibition.

*Body Worlds* has received much critique over the ethical issues of body disposal. Archbishop Richard Smith of the Catholic Archdiocese of Edmonton strongly opposes *Body Worlds* on the grounds that humans should be laid to rest. The church does not condemn body donation as long as the body will eventually be buried (Smith & Motiuk, 2008). Plastinates in *Body Worlds* are meant to last forever; in fact, plastinates are meant to be stable for at least 4000 years (Walter, 2004b). Walter (2004b) has explored plastination as a way to dispose of the dead and poses the question of when a corpse is no longer considered to be a corpse. Traditionally, a corpse becomes dust or ashes, but what is it considered when it becomes a plastinate? People normally consider a corpse to be wet and smelly, or it becomes ash or dust (Walter 2004b). Von Hagens categorizes his plastinates as a sub set of dry corpses, like mummies, skeletons, or dried specimens, which are normally allowed to be on display (Wetz, 2005). However, since people do not
have a schema for a plastic corpse this may be one of the reasons why some people find them disturbing (Walter, 2004b). Walter (2004b) claims that those members of the public who approve of plastination, must no longer view the plastinate as a corpse, but rather as simply being “transformed into dry remains…losing their original personhood” (p. 21).

If plastinates are considered as simply remains to last a lifetime, how is the grievers’ grieving process complete without a burial or cremation (Preub, 2008)? Perhaps other rituals must be found in order to account for the fact that plastinate remains will never be laid to rest in a location that grievers may visit.

*Body Worlds* has been charged with portraying death as a spectacle in order to obtain cheap thrills and to feel cold shivers. While critics continue to claim that the dignity of the dead has not been maintained, others argue that the educational experience brought to the public is paramount (Wetz, 2005). Since *Body Worlds* is presented in museums and science centres all over the world, there is obviously some kind of consensus regarding the potential of this exhibition to contribute to public education. The medium used (i.e. human cadavers) leads to the identification of controversial issues for many, which may have visitors responding with “a different kind of intellectual and emotional response…” (Pedretti, 2002, p. 16). In order to understand the visitor experience in the museum, the next chapter explores meaning-making in informal settings.

**Summary**

This chapter described how museum exhibitions have transformed from disordered curiosity cabinet displays, to thoughtful displays presenting objects in the context from which they belong (Cameron, 1971). Private collections have become
public, and museum curators attempt to create exhibitions offering visitors multiple entry points from which to construct meaning. Specifically, science centres utilize an interactive, hands-on approach to offer visitors the opportunity to construct meaning and develop scientific literacy skills by simultaneously learning science, doing science, and learning about science (Hodson, 1998). Scientifically literate citizens in addition to knowing some science, can capably make informed decisions about scientific issues both in school and non-school settings.

As museum curators design their exhibitions, they are reminded to be objective and transparent in the process of design (Bennett, 1995; Cameron, 1971; Leupken, 2011; Macdonald, 1998; Starn, 2005). Science is often viewed as authoritative, objective, reliable, and powerful; void of social, political, or cultural influence (Hodson, 1998). When creating exhibitions, curators are encouraged to “harness… science and technology to tell culturally authoritative stories about race, nation, progress and modernity” (Macdonald, 1998, p. 19). Cameron (1971) suggests that exhibitions should be designed with their original context in mind, yet should relate to contemporary society and experiences of the visitor so as not to misrepresent and encourage negative views of other cultures. Engaging with issues-based exhibitions invites visitors to consider multiple perspectives while learning about science in “the social, cultural, and political contexts in which science exists” (Pedretti, Macdonald, Gitari & McLaughlin, 2001, p. 413).

The use of human cadavers in the Body Worlds exhibition makes it a controversial issue-based exhibition. According to Oulton, Dillon and Grace (2004) a controversial issue involves a value judgment where argument surrounding the topic results from differences in religious, cultural or moral beliefs. While many people and special interest
groups debate the appropriateness of using plastinated cadavers in the *Body Worlds* exhibition, the fact that *Body Worlds* continues to be exhibited in cities all over the world, and attended by millions, implies that museums and the majority of the public find value in the display.

Museum curators recognize the unique needs and experiences that visitors bring with them to the museum and as such have re-conceptualized learners as active participants and constructors in their meaning-making. Silverman (1995) identifies the fundamental role of the individual in creating meaning from experience by relating past experiences to the present. Falk and Dierking (2000) identify meaning-making as a process involved in learning: “This process is at the root of all learning – learning is about meaning-making” (p. 61). Rather than trying to determine what is learned from a museum visit, this study sought to explore visitor responses to the exhibition which would offer insight into their active constructions of meaning. The next chapter will present literature related to meaning-making in informal settings.
Chapter 3
Literature Review – Meaning-making in Informal Settings

The purpose of this chapter is to examine literature related to learning and/or meaning-making in informal settings. The terms learning and meaning-making are both used in the literature, and this portion of the review will describe studies related to these concepts\(^3\). This chapter begins with literature surrounding underpinnings of the museum experience i.e., physical set up, the importance of the flow experience and identity in meaning-making. Learning theory will be described, and Falk and Dierking’s (2000) Contextual Model of Learning, which was central to this study, will be presented. The chapter concludes with an examination of research that is specifically related to Body Worlds and meaning-making.

Setting, Flow, and Identity

Historically, formal learning experiences are those contained within the classroom and directed by the teacher, whereas informal learning experiences are those that occur outside of the school. Falk (2001) introduced the term free-choice learning in order to describe learning that involves “free-choice, [is] nonsequential, self-paced and voluntary” (p. 7). This term emerged upon recognizing that the physical setting of the learning environment, be it formal or informal, cannot solely influence learning (Falk, 2001). Free-choice learning also considers individual interaction with his/her sociocultural and physical environments (Falk, 2001). More will be said about this later in the chapter when I describe Falk and Dierking’s (2000) Contextual Model of Learning.

\(^3\) For the purpose of this research, the reader is reminded that meaning-making will be used during the interpretation portion of this paper. I will use the term meaning-making which I believe emerged through what people said to me and others during interviews, and as expressed in comment books. This could be a form of learning, but learning seems to be a much larger and all-encompassing term which was outside the scope of this study.
While observing people in free-choice learning situations (e.g., chess playing, dancing, painting, rock climbing) where extrinsic motivational rewards were lacking, Csikszentmihalyi and Hermanson (1995) found the quality of the experience to impact people’s attention to the task. They coined the term *flow experience* as “a state of mind that is spontaneous, almost automatic, like the flow of a strong current” (Csikszentmihalyi & Hermanson, 1995, p. 70). Activities that produce flow have clear goals and rules and the participants know what is expected at all times. For example, in a tennis game, the player is aware of the goals and rules every second of the game. Flow activities thus offer the participant immediate feedback continuously throughout the experience. In this regard, the participant is highly accountable for his/her actions, allowing him/her to immerse him/herself in the activity (Csikszentmihalyi & Hermanson, 1995). Another characteristic of the flow experience is that the activity or challenge must equal the person’s ability. If the challenge is too difficult, stress will arise, and if the challenge is too easy, boredom will result. In a state of balanced challenge with ability, attention and concentration are maximized.

Science centres (a free-choice institution) may enhance the visitor experience by creating flow experiences for their patrons. While science centre mission statements include a desire to pique curiosity and interest, this is only the first step in the flow experience. Following the initial “hook,” science centres must produce stimuli that appeal to prior personal interest. Creating sustained interest can be accomplished by providing opportunities for involvement through sensory, intellectual, or emotional experiences. The experience must foster feelings of uncertainty and the possibility of discovering something new (Csikszentmihalyi & Hermanson, 1995).
While museums, at first glance, appear to be ideal alternatives to the classroom, boasting hands on, multisensory, novel, fun, free-choice activities, the absence of a teacher does not immediately provide patrons with the feedback required to sustain the flow experience. Museums are thus challenged with how to communicate to visitors so that their persistence in a task will produce a worthwhile end result. Allen (2007) believes the solution to this problem lies in immediate apprehendability. This term describes a visitor experience with a museum exhibit as one that is unconsciously understood in terms of its purpose, usability, and properties immediately upon interaction. This is thought to lessen distractions and creates a comfortable space from which curiosity can be explored. Once this curiosity is piqued, in an immediate apprehendable situation, the visitor may take the time to read and make sense of the scientific information being presented.

While the museum exhibition itself is important in influencing a visitor’s experience, what the visitor brings to the museum may be equally important. Falk (2009) proposes considering visitor identity-related motivations and their impact on the visitor experience: “Learning and sense of identity are inseparable: They are aspects of the same phenomenon” (Falk, 2009, p. 60). Falk (2009) asserts that every visitor brings personal motivation, interest, and prior knowledge and social cultural expectations to their museum visit. The model emphasizes that “the museum visitor experience is neither about the visitors nor about the museums and exhibitions, but rather it is situated within that unique and ephemeral moment when both of these realities become one and the same… ” (Falk, 2009, p. 35). In this sense, the museum and visitor are not to be thought of as independent entities, creating a single prescribed experience, but instead as a
complex interaction that can lead to multiple interpretations and experiences that suit an individual’s needs at that particular moment in time. This new way of thinking requires that visitors be not defined by qualities such as age or ethnicity, but instead be viewed as unique individuals who have the potential to experience museum exhibitions in very different ways (Falk, 2009).

In order to explain how identity influences visitor experiences at the museum, Falk (2009) utilizes Maslow’s hierarchy of needs. At the base of the pyramid lies the drive to satisfy basic human needs such as eating and drinking. Once these are satisfied, humans are capable of satisfying more complex needs with the ultimate goal being self-actualization. To achieve self-actualization involves becoming fully self-aware and fulfilling one’s potential. This goal was thought to be attained primarily through one’s work, however, it is currently believed to be met through how one spends one’s leisure time (Falk, 2009). The 21st century is seeing individuals moving away from “escapism” types of vacations (e.g., Disneyland or the beach) to leisure activities that include adventure and culture. Manfredo, Driver and Tarrant (1996) describe the leisure experience as one that should be “conceptualized as a psychophysiological experience that is self-rewarding, occurs during non-obligated free time and is the result of free choice” (p. 189). In this way, the leisure activity becomes a way to satisfy one’s internal needs leading to the ultimate goal of self-actualization – all of which inform one’s identity.

Falk (2009) classified identity in two ways. “Big ‘I’ identities” include demographic characteristics such as age, gender, ethnicity, social groupings to name a few, while “little ‘i’ identities” are behavioural in nature. With a focus on little i identity,
Falk (2006) proposed five leisure identity-related motivation categories – explorers, facilitators, professional/hobbyist, experience seekers and spiritual pilgrims. **Explorers** are curious and are interested in the content of the museum whereas **facilitators** are socially motivated, wanting to enable a social learning experience for others. **Professional/Hobbyists** are motivated by content as it closely resembles their work or personal hobby. The **experience seekers** feel that the museum is an important place to visit and fulfills the need to have “been there, and done that.” Finally the **spiritual pilgrims** (later named rechargers) seek a spiritual or restorative experience. A study involving visitor motivations to zoos and aquariums saw 55% of visitors exhibiting a clear motivation for attendance, while another 7% had dual identity motivations, with **explorers** and **facilitators** being the dominant identities (Falk, Heimlich & Bronnenkant, 2008). Interview analysis included sorting data according to four criteria: the main actor, general subject of the narrative, types of satisfaction visitors expressed, and types of feelings expressed. Each of the five identities provided similar responses with respect to the categories. For example, **explorers** were always main actors in their interview, sharing what they learned with the interviewer (Falk et al., 2008). While all five identity categories cannot account for all identity motivations, they do offer insight into the variability of visitor motivations.

Falk (2009) asserts that the museum serves as the intersection point between leisure and learning. Falk and Dierking’s (2000) Contextual Model of Learning is a popular tool for helping to “organize the complexity of what people do within a museum by describing the visitor experiences as a set of interacting, contextually relevant factors” (Falk, 2009, p. 34). While the Contextual Model of Learning is not in the truest sense a
model as it is unable to predict what museum visitors will do or learn, it is a useful tool or framework for organizing the visitor experience within the museum (Falk & Storksdieck, 2005). In the following section, the Contextual Model of Learning is described in more detail.

**Contextual Model of Learning: Making Meaning and the Visitor Experience**

Falk (2001) argues that while learning has always occurred in museums, the museum was underappreciated in its role to facilitate learning. Early museum research set out to determine whether pre-determined information would be learned, supporting the idea that knowledge may be transmitted from the museum to the visitor (Falk, 2001). Today, learners are considered to be active constructors of meaning rather than passive recipients of information making early museum studies limited in their ability to showcase the complexity of learning (Falk, 2001; Hooper-Greenhill, 1999; Silverman, 1995).

Piaget was the first theorist to introduce the learning theory of constructivism which posits that people actively make meaning of the world around them by assimilating information into pre-existing schemas (mental frameworks of information) or accommodating schemas to make sense of new information. Piaget did not view the learner as a passive recipient of information. Instead, he recognized the learner as an active constructor of knowledge, seeking to make sense of their surroundings by comparing pre-existing knowledge to current experiences (Allen, 2007; Hein, 1998). Knowledge construction is viewed as a primarily independent process where “conclusions reached by the learner are not validated by whether or not they conform to
some external standard of truth, but whether they ‘make sense’ within the constructed reality of the learner” (Hein, 1998, p. 34).

Vygotsky agreed with Piaget that the active mind is central to making sense of phenomena (Hein, 1998), but he introduced the idea that learning requires a more knowledgeable other to scaffold the learning process, hence social constructivism. Vygotsky viewed knowledge construction as a social process, identifying the zone of proximal development - the difference between what one can do on their own, compared with what they can do with the support of a more knowledgeable other (Vygotsky, 1978).

Every function in the child’s cultural development appears twice, on two levels. First, on the social, and later on the psychological level: first between people as an interpsychological category, and then inside the child, as an intrapsychological category. (Vygotsky, 1978, p. 128, emphasis in original)

For Vygotsky, social constructivism requires both active engagement and a social opportunity.

Applying the theory of constructivism to learning in free-choice settings would imply that visitors actively attempt to make meaning of their surroundings, and it is usually a social process. Silverman (2004) describes:

Whether art, history, science, anthropology, popular culture, or kitsch, we each exercise a variety of skills – including identification, description and evaluation – that are similar to those of the museum professional in responding to objects in most context[s]…. Those processes are social; the meaning[s] we make are influenced and constrained by other people, including those with whom we participate in relationships and social groups. (p. 237)
Emerging from Vygotsky’s theory of social constructivism, sociocultural theory identifies the importance of culture, environment and history in the construction of meaning (Schauble, Leinhardt, & Martin, 1997). Central to sociocultural theory is the idea that human social interaction occurs within a cultural context, and is simultaneously an individual and social process: “humans are at once individuals and members of a larger group or society; learning is both an individual and group experience... What someone learns is inextricably bound to the cultural and historical context in which learning occurs” (Falk & Dierking, 2000, p. 41). Hein (1998) describes how meaning results from individuals interacting with social contexts and mediators of tools, talk, signs and symbols resulting from culture, environment and history. “Individuals shape the environment that contains these mediators, as they are simultaneously shaped and changed by them” (Hein, 1998, p. 149). In response to this theorizing museum curators acknowledge the centrality of social and cultural influences and prior knowledge on visitor meaning-making in the museum, and hence the diversity of meanings that visitors may make within an exhibition. As a result when referring to museum audiences, the term general public was replaced with differentiated audience (Hooper-Greenhill, 1999, p. 5).

The shift from viewing the transmission of meaning along a one way path, to meaning-making as a negotiated process between parties involving the creation of knowledge, saw museums beginning to identify “the role and authority of the individual or ‘reader’ in shaping the meaning of a ‘text’ or experience” (Silverman, 1995, p. 161). In light of this paradigm shift, Silverman (1995) argued that exhibitions should support as many meanings as possible, while incorporating human needs into exhibitions. When
creating exhibitions, Dierking (1996) writes “I have found it really provocative to think first of the experiences we want the visitor to have and then to try to create an exhibit or space that will allow those experiences to happen” (p. 22). By viewing visitors as active participants in meaning-making and acknowledging their unique and, at times, shared constructions of knowledge, asking the museum visitor to describe their experience with an exhibit can offer insight into their construction of meaning.

Falk and Dierking’s (2000) Contextual Model of Learning draws on constructivist, cognitive, and sociocultural theories of learning in an attempt to account for factors involved in meaning-making in the museum (Falk & Storksdieck, 2005). The model posits that learning is embedded within personal, sociocultural, and physical contexts over time. Learning is always changing with time as the individual interacts with his sociocultural and physical world (Falk & Dierking, 2000). Including time in the model demonstrates how learning is never ending but rather involves the continuous interaction and integration between the three contexts.

Learning can be conceptualized as a contextually driven effort to make meaning in order to survive and prosper within the world; an effort that is best viewed as a continuous, never-ending dialogue between the individual and his or her physical and sociocultural environment. (Falk & Storksdieck, 2005, p. 745)

The personal, physical and sociocultural contexts are fluid and overlap, however all must be present so that meaning-making can occur. The model in no way intends to simplify learning; rather it offers a way to organize the complexity of learning that occurs in

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4 The Contextual Model of Learning is a useful framework for thinking about contexts that may contribute to meaning-making in informal settings. It was useful in this study for organizing the visitor experience within the museum.
museums (Falk & Storksdieck, 2005). Each of the contexts and their factors will be described below.

**Personal context.** Every individual who visits a museum brings with him or her prior knowledge, experience, expectations, and reasons for choosing to attend the museum on that day. Falk and Dierking’s (2000) model describes three factors that fall within the personal context: 1. Motivation and expectations, 2. Prior knowledge, interests, and beliefs, and 3. Choice and control. All of the above factors are thought to contribute to meaning-making in the museum setting.

With respect to motivation, individuals may be intrinsically or extrinsically motivated to learn about a particular topic. A person who decides to visit a museum has made the personal choice to be there, hence showcasing the internal motivation involved in a museum visit (McCombs, 1991). Museums do not offer extrinsic rewards such as money or certificates for visitors, on the contrary, visitors often pay an admission, hence demonstrating that visitors freely enter into the museum environment simply due to the internal satisfaction or joy it may bring them. Learning has been found to be most effective for intrinsically motivated individuals (McCombs, 1991).

Motivation is a complex construct that involves interest (Schiefele, 1991). A museum visitor may be drawn to a specific exhibit where information of interest is presented to the viewer. In order to promote learning, interest is not simply defined as what someone likes or dislikes, but rather includes psychological constructs such as sustained attention, curiosity, and persistence with the task (Falk & Dierking, 2000). *Individual interest* is consistently present within the individual and leads to particular activities that support the interest. On the other hand, *situational interest* may be induced
by creating emotional stimuli and is transient (Schiefele, 1991). Hidi and Renninger (2006) have developed a four-phase model for interest development: 1. **Triggered situational interest** involves short term changes in affective and cognitive processes triggered by environmental factors that are novel, strange, surprising, personally relevant, or intense. 2. **Maintained situational interest** requires focused attention following the subsequent triggered state that is sustained through task meaningfulness and/or personal involvement. 3. **Emerging individual interest** marks the beginning of a predisposition to seek continuous engagement with content and 4. **Well-developed individual interest** involves purposeful pursuit of seeking answers to questions related to the topic of interest. Museum visitors freely enter into informal learning experiences at the museum, and it is up to curators to engage their personal interest and motivation.

Turner (1995) indicates that individuals experience interest in a task when they have some control over the environment. For example, students who are given the freedom to choose task specifics see interest and commitment to the task increase, leading to a desire to do well. Choice fosters autonomy and autonomous learners report greater interest in their school work and exhibit a greater sense of competence. Students able to set their own goals for learning showed greater intrinsic motivation (Turner, 1995). On the other hand, students pressured to perform on a test, and given little control over their learning produced low intrinsic motivation, and students had little interest in the task. Events that pressure students towards specific outcomes undermine their ability to choose. Instances where choice is discouraged or denied have consistently been found to decrease intrinsic motivation (Deci, Spiegel, & Ryan, 1982). Most research surrounding choice and motivation has been conducted in the classroom where
constraints inherent to education are imposed. A museum however, as a free-choice learning institution offers visitors the ability to control their own learning by choosing which exhibits to attend (Falk & Dierking, 2000). The above factors, when engaged, may positively influence visitor experiences as they move through the museum.

Pedretti (2004) identified the Personal Context to be particularly significant for learning as visitors engaged with issues-based exhibitions. She identified four factors within the personal context that contributed to visitor learning while they interacted with issues-based exhibits: Personalizing subject matter; evoking emotions; stimulating dialogue and debate; and promoting reflexivity (Pedretti, 2004). Personalizing and humanizing science involves ensuring that “(i) learning is rooted in the personal experiences of individual learners; (ii) science is seen as more person oriented; (iii) science education is infused with sound human and environmental values” (Pedretti & Hodson, 1995, p. 465). Pedretti (2004) examined Mine Games, an exhibition exploring the mining industry’s effect on the community, and A Question of Truth, an exhibition tackling questions about the nature of science, racism, stereotyping, health and well-being, IQ testing, eugenics and slavery. Both exhibitions deal with contentious issues and are meant to be thought provoking. Pedretti (2004) found that these exhibitions were effective in enhancing learning due to the potential for visitors to make real-life connections as they pondered the environmental, social, and political issues located within the displays. The content of the exhibitions elicited emotional responses for visitors suggesting that emotion coupled with personal connections, helps to enhance motivation and engagement for visitors, increasing the potential for learning (Pedretti, 2004). This coincides with research examining affect in learning that suggests emotions
contribute to initial and sustained interest and engagement in the subject matter, and the foundation for building memories (Falk, 2009; Falk & Gillespie, 2009). In addition, emotion was found to be central to the decision making process (Bechara, Damasio & Damasio, 2000), making it particularly important when analyzing and positioning oneself within an issues-based exhibition. Finally, according to Pedretti (2004) language and talk were found to be central to learning and “reflexivity and dissonance caused by issues-based exhibitions... create[d] powerful learning opportunities for visitors” (p. 43). Visitors in both exhibitions confronted their own personal beliefs compared with the political, social, and cultural reflections of science on display, highlighting the prominence of this context in visitor meaning making, specifically with controversial issues-based exhibitions (Pedretti, 2004).

**Physical context.** When asked to recall their experiences, visitors to museums normally describe the things they did or what they saw. In light of this, the physical factors of the Contextual Model include: 1) orientation and advanced organizers, 2) design, and 3) reinforcing events or experiences outside of the museum. While classroom experiences are often guided by the teacher, the museum relies on signs, objects, labels, recorded clips, and at times museum guides to facilitate the learning experience (Falk & Dierking, 2000). When considering design, Serrell (2006) describes an ideal exhibition as one that is comfortable, engaging, positively reinforcing, and meaningful for the visitor. Exhibitions offer more than the 2-dimensional information available to people through magazines, TV etc., instead they offer the visitor authentic objects in 3-D (Falk & Dierking, 2000).
Barker and Wright’s (1955) work on *behaviour settings* describes how physical settings reinforce particular behavioural rules that are culturally constructed. In other words, physical settings have the potential to induce particular behaviours (e.g., quiet in a library, lining up at the movie theatre). People learn to associate particular settings with learning; “the mechanics of this place-dependent aspect of learning is deeply embedded within our psyche. Because learning is context specific, contexts can facilitate or inhibit learned behaviours” (Falk & Dierking, 2000, p. 56).

Apart from the physical layout of the exhibition, the physical context includes the importance of reinforcing experiences the visitor may have once they leave the museum. These “enabling contexts” occur outside of the museum, weeks, months or even years later, and reinforce learning that occurred within the museum (Falk & Dierking, 2000, p. 140). In this sense, learning within the museum does not respect institutional boundaries but rather relies on a myriad of experiences to consolidate learning (Falk & Dierking, 2000).

**Sociocultural context.** Vygotsky’s (1978) theory of social constructivism describes human learning as a social endeavour. “Conversation is reflective of the fact that much of the way humans make sense of the world is through social interaction with others…” (Falk & Dierking, 2000, p. 38). Reality, knowledge, and learning are a product of human activity, constructed socially and culturally (Falk & Dierking, 2000). “The sociocultural context defines both who we perceive ourselves to be and how we perceive the world we inhabit… The world has meaning for us because of the shared experiences, beliefs, customs, and values of the groups that inhabit it with us” (Falk & Dierking, 2000, p. 39).
When describing the sociocultural context in the Contextual Model of Learning, Falk and Dierking (2000) ascribe to:

…an ecological approach, which defines culture as an adaptation, a social mechanism enabling individuals to survive. Within this context, learning can be viewed as a process by which a society “shapes the mind” of individuals to create the kind of persons who, as adults, will “be able to meet the imperatives of the culture.” (Falk & Dierking, 2000, p. 39)

Ogbu (1995) has written about the numerous conceptualizations and understandings of culture. He describes five key components that comprise culture. 1. Customary ways of behaving; 2. Codes of assumptions, expectations, and emotions underlying customary behaviours; 3. Artefacts made by members of the population that has meaning for them; 4. Institutions reflective of knowledge, beliefs, or skills; and 5. Patterns of social relations (as cited in Falk & Dierking, 2000, p. 40). All of the above components contribute to culture which may persist and evolve as it is passed on to the next generation (Falk & Dierking, 2000). They also play an important part of how visitors make-meaning as “our perception, descriptions, and understanding of the worlds are all culturally and historically bound” (Falk & Dierking, 2000, p. 41).

Matusov and Rogoff (1995) describe a sociocultural approach as it pertains to learning in the museum: “cultural development involves individuals becoming members of communities of practice…” (p.103). Using Vygotsky’s (1978) work on sociocultural teaching to create a zone of proximal development (where accomplishing a task requires collaborative efforts with a more knowledgeable other) to guide development, Matusov and Rogoff (1995) describe a community of learners approach that:
…focus on mutuality in joint activity and guidance rather than on control by one side or the other. In a community of learners, both the visitors and museum staff are seen as active in structuring the inquiry, with museum staff assuming responsibility for guiding the process and visitors learning to participate in the management of their own learning. (p. 98)

Using a sociocultural approach, Matusov and Rogoff (1995) view the community of learners approach to involve a participation philosophy that:

…treats all the participants in an educational institution as learners who share interests and expertise. Educational leaders have the responsibility to guide this process [socially mediated education], while children, students, and visitors have the responsibility to contribute to their own learning and, given the opportunity, to assist the educational leaders in developing their roles. (p. 97)

The majority of museum visitors arrive and move through the museum with other members of a social group, each of which represents a unique community of learners (Falk & Dierking, 2000).

The sociocultural context of Falk and Dierking’s (2000) Contextual Model of Learning focuses on factors involved in social aspects of learning and include: 1) within-group sociocultural mediation and 2) facilitated mediation by others. The museum often has visitors attend in small or large groups and so the sociocultural context includes the factor of groupings as a way to explore and create new knowledge, to reinforce shared beliefs, and to facilitate meaning-making (Falk & Dierking, 2000). Museum employees are often seen as knowledgeable and play a role in disseminating information and guiding the visitor’s experience.
Briseno-Garzon (2013) identifies that much research has been done in the area of social aspects involved in meaning-making, many of which have been situated in Anglo sociocultural contexts. Briseno-Garzon (2013) argues that to fully understanding learning taking place, both social constructivism and sociocultural theory need to be taken into account: “learning is both a process of individual and social construction based on prior experience, and a process of enculturation by which learners develop a sense of identity that encompasses social norms, ideologies, language, and values” (p. 309). Both frameworks (social constructivism and sociocultural theory) highlight the importance of collaboration and cultural mediation as visitors move through the museum (Briseno-Garzon, 2013). Social constructivism involves personal experiences embedded within social contexts that result in beliefs, understandings and attitudes that simultaneously influence personal and collective understandings, while sociocultural theory involves the continuous interaction between the learner, environment, and social situation (Briseno-Garzon, 2013). Taken together “meanings are derived from the dynamic interplay between individuals and their social groups and are the result of a process that involves the continuing reflection upon past and present experiences, evaluation, and judgment within a social and physical context” (Briseno-Garzon, 2013, p. 309). Research in museums often involves observation of social interaction between visitors, however, the individual visitor’s prior experiences and identities within social contexts should be considered. As well cultural values, expectations, and beliefs cannot be ignored or underestimated in influencing learning in museums.

Schäuble, Leinhardt, and Martin (1997) use sociocultural theory as a framework for learning, and describe the applicability of this theory to creating a research agenda for
the museum. Sociocultural theory suggests a focus on process rather than product. Thus, in order to understand learning, the process of human thinking needs to be examined i.e., talk, tools, symbols, artifacts, history and activity in the formation of meaning. Schäuble et al. (1997) identify the variability that exists among people and areas for study:

Important forms of variability for study include the experience, knowledge, and interests that visitors bring to museums; the kinds of activities and pathways in which visitors engage during their visits; and the means by which museums contribute to their evolving ways of knowing and responding to the world. (p. 4)

In an effort to understand all visitors’ experiences and understandings, variability, in addition to commonalities should be examined. Schäuble et al. (1997) furthermore describe taking a developmental approach to research, “identifying relationships between visitors' long-term interests and goals and the museum; and studying the role of important social units, such as peers, families, and communities, in an individual's experiences with the museum” (p. 4). In using a sociocultural approach to research in the museum a comprehensive understanding of the visitor experience will emerge.

While the Contextual Model of Learning organizes the social factors that affect a visitor’s meaning-making when situated within the museum itself, it does not include factors that take into account the larger contexts: namely visitor identity, history, and experiences (pre and post visit).

More recently, Falk’s work has undergone a further iteration, resulting in the Museum Visitor Experience Model (Falk, 2009). In proposing the new model Falk (2009) recognizes that visitor meaning-making cannot be determined by looking independently at the museum or at the visitor. Instead a stochastic (collective interactions determine
outcomes) model representing unique individuals each capable of having a wide range of visitor experiences in response to the same exhibition is more applicable (Falk, 2009). Identity-related motivations and experiential contexts described in the Museum Visitor Experience Model jointly shape the outcome of the visitor experience. This new model includes the knowledge of five identity related motivations (explorers, facilitators, professional/hobbyist, experience seeker, and spiritual pilgrim), described at the onset of this chapter, that permits for parts of the visitor experience to be “knowable and predictable… allow[ing] museums to become markedly better at the services they provide their visitors” (Falk, 2009, p. 177). While this research study predominantly used the Contextual Model of Learning’s factors located within the personal, sociocultural, and physical contexts to organize and analyze data (as will be discussed in the methodology section), it acknowledges the importance of identity in visitor meaning-making, and broadly explored these identities as well.

Visitor Research with Body Worlds

Examining visitor responses to a museum exhibition can serve to further enrich understanding of their experiences. While a limited number of studies have explored visitor experiences with the Body Worlds exhibition, they do impart valuable insight into visitor experiences with this exhibition. Visitor’s meaning-making and responses resulting from prior research conducted at the Body Worlds exhibition will be presented here.

In order to begin to assess the educational potential of the exhibit, the Institute for Plastination (IfP) (2005) conducted an exit poll of 1000 visitors and found that 46% of individuals felt motivated to improve lifestyle after visiting the anatomical exhibit, while
54% did not feel inspired to change their way of living. Another poll conducted by the IfP (2004) found that 30% of participants questioned six months after visiting Body Worlds indicated that 9% drank and smoked less, 33% improved their diets, 25% played more sports, and 14% became more conscious of their bodies compared with their lifestyles prior to visiting the exhibit. These results, however, are not generalizable as both samples were small. Burns (2004) suggests that further investigation into visitor responses to Body Worlds, and their subsequent lifestyle changes are necessary in order to assess the impact of this exhibition on its visitors.

Social scientist vom Lehn (2006) used video footage and field notes of people interacting among the bodies in the exhibit to theorize about how individuals make sense of what they observe in Body Worlds. Proponents of Body Worlds claim that individuals looking at bodies are able to see themselves in the bodies and as such come away with a clear vision of their own bodies. Visitor prior knowledge and interest, can categorize the museum visitor as either a specialist or general public (Burns, 2007). Specialists are those who are immersed in the medical profession and who have much experience with anatomy, while general public refers to the lay person. Von Hagens (2005) describes his plastinates to include extensive detail that showcase the variation found between bodies. While only specialists will appreciate these resources, von Hagens hopes “the ‘democratization’ of anatomy will encourage people to improve their health and become more literate about science” (Burns, 2007, p.13).

The idea of being “clinically detached” while viewing Body Worlds has appeared in a number of articles (Burns, 2007; Moore & Brown, 2007; Walter, 2004a). Clinical detachment is a term used to describe how medical professionals separate themselves
from cadavers in a dissection lab so that they are able to objectively view and treat the body (Walter, 2004a). In the case of *Body Worlds*, Burns (2007) argues that clinical detachment does not occur when viewing the plastinates as the faces and hands, two components thought to have emotive value, are not recognizable. Kuppers (2004) similarly describes the accessibility of the exhibition as the messiness of the real human body is removed (no blood, no smell). Moore and Brown (2007) further describe how animated and familiar poses reduce viewer discomfort and plastinates are anonymous with no personal information available. As a result of the human cadaver being displayed devoid of fluids, smell, or identifiable emotive components, the defense of clinical detachment required by the viewer is not needed here (Walter, 2004a). Instead, observers are able to view plastinates simply as dynamic objects rather than human beings and can observe them with a medico-scientific gaze (Burns, 2007; Walter, 2004a). Since visitors do not necessarily clinically detach, they are instead offered the opportunity to experience anatomical awe – an appreciation of the body’s inner workings (Pedretti, 2012; Walter, 2004a). Visitors may appreciate the intricateness and delicateness of the human body which may serve to influence their future health related behaviours (vom Lehn, 2006).

Studies found that individuals interacting with the exhibits tended to engage in discussion surrounding the body and illness (Pedretti, 2012; vom Lehn, 2006). As groups of people discovered things in the exhibition, they momentarily transposed their discoveries onto their own bodies. This resulted in the group orienting themselves towards a common object, and their gestures and dialogue indicated that they shared their personal experiences of pain and suffering. Thus, the observer engaged in a “social interaction that involve[d] both awareness of the biological aspects of the body and the
experience of a bodily condition they have once been affected by” (vom Lehn, 2006, p. 244). Through interactions with their companions, people discovered plastinates and viewed them through the lens of their own personal knowledge of, or experience with the illness, injury or lifestyle problem on display in front of them. They were able to share with their companions illness narratives where their personal experiences were relayed in relation to the real life objects they were viewing. In this way, their personal illness narratives, for a moment in time, were brought back to life in relation to what they were observing (Pedretti, 2012; vom Lehn, 2006). This finding does not support the view that visitors observed the plastinates with a clinically detached gaze, as anatomy or medical students often view corpses (Walter, 2004a), but rather describes the personal lens (including illness narratives, and personal knowledge of and experience with the body) visitors use when making meaning of this exhibition (Pedretti, 2012; vom Lehn, 2006).

Visitor responses to the *Body Worlds* exhibition have been varied. MacDonald (2005) found that although examination of visitor comment books provides a plethora of visitors’ responses to museum exhibitions, they often go unused. In addition to short evaluative comments (eg. cool and interesting) longer reflective comments may also be found in comment books (MacDonald, 2005). Visitor comment books belonging to *Body Worlds* have been examined by Moore and Brown (2007) and Walter (2004a).

Walter (2004a) found that consensus surrounding the nature of the plastinates did not exist as a variety of terms were used to describe them: *real people, dead people, plastic, meat, synthetic, someone’s father, brother etc.* This ambiguity suggests that the various interpretations of the figures may lead to variance in meaning-making. Beyond singular comments (for example: signing their name or one word expletives), visitor
experiences were clearly documented (Moore & Brown, 2007). Generally, comments were positive with many thanking von Hagens, sponsors, body donors, or God for the opportunity to partake in the experience. Some comments indicated annoyance with the unsupervised children in the exhibition, and numerous “dittoes”, obscenities, insults (at von Hagens or previous comments written by other visitors), signatures, and pictures were present.

Prevalent responses to the exhibition included reaction to the plastinates themselves and that of mortality. The fetus display evoked debate of when life begins, while others thought about the end of life and the possible existence of an immortal soul: “On the philosophical side, this is laughing at Death, as saying: ‘nevertheless, despite your cruel grasp, we defeated you by being of some good use to others by looking alive and teaching’" (Moore & Brown, 2007, p. 245). Many visitors commented on the dichotomy between life and death.

Visitors noted how the exhibition reinforced stereotypes: “Why are all the women in strange acrobatic positions but the men are all standing in a natural state?...” (Moore & Brown, 2007, p. 246). Beyond sexism, issues involving race were also found. Some visitors commented on wanting to see all skin colours on display, while others acknowledged that race is only skin deep and the exhibition illustrated how we humans are all interconnected.

Visitors responded to the nature of the display and the origin of the body. Some condemned the exhibition for being a freak show while others felt homage should be paid to the plastinates. Some comments alluded to intelligent design, claiming that the exhibition was proof of God’s engineering. In these instances remarks of how the display
supported religious beliefs were often made. Other comments found the exhibits to support evolutionary theory as opposed to a God (Moore & Brown, 2007).

Educational institutions have purchased plastinates to further enhance anatomy teaching (Walter, 2004b). Von Hagens argues that plastinates allow students to experience the individuality that exists among human bodies. By observing plastinates, students learn about the size, position and form variability of organs (Walter, 2004a). When Walter (2004a) studied comments in guest books however, no reference was made, even from medical doctors, to this anatomical individuality. On the contrary, visitors commented on how similar humans are; “Under the shell of our skins, our bodies are all so similar, regardless of colour of skin!” (p. 482).

Visitor interviews and surveys were usually positive with participants speaking to the potential for informed changes in diet and lifestyle habits, however, visitors also expressed their disapproval of the visual representation or ethics behind plastination (Institute for Plastination, 2004, 2005; vom Lehn, 2006; Walter, 2004b). Alberti, Bienkowski, Chapman, and Drew (2009) discuss both the pros and cons of displaying the dead, supporting the idea that tensions exist when examining responses to the Body Worlds exhibition.

Notwithstanding the above, there are few studies exploring visitor responses to an exhibition that has accrued over 34 million visitors worldwide. Further exploration of visitor responses may offer insight into the meaning visitors make of the exhibition and reasons for its continued success. Science centres aim to attract patrons and provide them with valuable learning experiences; understanding visitor meaning-making of the Body Worlds exhibition may prove invaluable to promoting these goals.
Summary

This chapter reviewed literature related to meaning-making and more broadly learning in informal settings. Of particular importance is how setting, flow, and identity can influence visitor meaning-making while in the museum. Falk (2001) introduced the term *free-choice learning* in order to describe learning that involves “free-choice, [is] nonsequential, self-paced and voluntary” (p. 7). In order to maximize the visitor experience while in the museum Csikszentmihalyi and Hermanson (1995) coined the term *flow experience* to highlight the importance of creating activities that allow participants to immerse themselves in the activity through a challenge that equals a person’s ability. Clear goals, rules, expectations, immediate feedback, and balanced challenge with ability, may serve to maximize attention and concentration to the exhibits at hand (Czikzentmihalyi & Hermanson, 1995). In addition to paying close attention to exhibition design, Falk (2006) proposes that curators should also attend to what visitors bring with them to the museum. Falk’s (2009) new model of learning in the museum, the *Museum Visitor Experience Model*, builds on the Contextual Model of Learning and incorporates work on identity-related motivations. Falk (200) identifies five identity related motivations – explorers, facilitators, professional/hobbyist, experience seekers and spiritual pilgrims, which influence a visitor’s experience while in the museum.

This study relied on the Contextual Model of Learning’s contexts to guide initial data analysis, while simultaneously exploring visitor identity in their meaning-making. Falk and Dierking’s (2000) Contextual Model of Learning draws from constructivist, cognitive, and sociocultural theories of learning and serves to “organize… thinking regarding the complex nature of museum learning” (p. xii). Their model asserts that
learning is situated within three contexts – *personal, physical, and sociocultural* over time, and “learning can be viewed as the never-ending integration and the interaction of these three contexts over time in order to make meaning” (Falk & Dierking, 2000, p. 11). Pedretti (2004) found the personal context to be particularly salient in visitor meaning-making of controversial issues-based exhibitions as these exhibitions evoked emotional, intellectual, and at times spiritual responses in visitors. Issues-based exhibitions invite visitors to consider their own personal beliefs while reflecting on science embedded within political, social, and cultural structures, demonstrating the importance of the personal context in visitor meaning-making (Pedretti, 2004).
Chapter 4
Methodology and Methods

This case study investigated visitor responses to the *Body Worlds* exhibition. The chosen research methodology assisted in revealing the complex nature of visitor responses and meaning-making in an unconventional science centre display. The research methodology provides a rationale as to why the particular approach is appropriate for this study and is followed by a discussion of research methods.

**Research Questions Revisited**

Given a constructivist framework for learning, rather than asking visitors what they have learned about a specific scientific phenomenon, in this case about the human body, it is more appropriate to ask “what the visitor makes of the exhibit” (Tofield, Cole, Vyle, & Bolstad, 2003, p. 71). Asking visitors to explain and talk about their experiences with an exhibition offers insight into the meaning they make. The broad aim of this research is to understand the visitor experience with this exhibition (deemed controversial by many) as it seems to evoke a variety of responses from the public.

The following questions governed this study:

**Within the context of the *Body Worlds* exhibition:**

a. What meaning do visitors make and how do they respond to the exhibits?

b. What tensions and issues arise for visitors?

c. What does this type of exhibition convey about the changing role of science centres and the nature of their exhibitions?
Methodology

Epistemological orientation. In order to obtain a rich characterization of the complex social-dynamic relationships that exist within education contexts, I identify with a postpositivistic epistemology. While positivists attempt to describe phenomena through objective, measurable observation and recognize truth as objective, independent and absolute (Mertens, 1998), postpositivism recognizes that observation of social phenomena is never unbiased, as the researcher is heavily involved in the research process, so much so that they themselves become an instrument (Mullholand, 2007). Macpherson (1996) suggests “…that observation is theory laden, that plural views of the world are one of many sources of knowledge about the world, and that knowledge grows holistically through competition between theories” (p. 4). Postpositivism thus assumes a mind dependent, subjective truth, with multiple realities (Phillips & Burbules, 2000). Postpositivists acknowledge that a reality exists; however, it is constrained by human limitations (Mertens, 1998). Researchers cannot come to reality with one hundred percent certainty; however, they come closer to the truth by eliminating or discrediting alternate theories (Mertens, 1998). Postpositivism thus offers an appropriate epistemological orientation for my work, as theoretical frameworks guide and structure my research methodology. Knowledge gleaned from data collection, can serve to strengthen a theory or discredit it. Postpositivists see that multiple truths may exist for the same observation and by pooling information, and comparing theories, knowledge is expanded.

In light of the above epistemology, a methodology arises. While epistemology explores the nature of knowledge, methodology is the vehicle by which that knowledge emerges. Qualitative researchers can be seen as “meaning makers who draw on their own
experiences, knowledge, and theoretical outlooks, to collect data and to present their understanding to the world” (Mulholland, 2007, p. 45). Thus, qualitative methodology appeals to me, as I see value in relaying interpretation of events that are grounded in theory.

**Research design.** The aim of this research study was to determine how visitors respond to *Body Worlds* and what meaning they make of the exhibition. Using interviews, comment books, and field notes, visitor responses were obtained in order to broaden understanding of meaning-making taking place. As indicated in the preceding literature review the phenomenon of meaning-making in free choice learning contexts is a complex one that can be best assessed by qualitative means. Meaning-making is affected by personal, sociocultural, and physical contexts (Falk & Dierking, 2000), and qualitative research permits the opportunity to understand contexts or settings, because “we cannot separate what people say from the context in which they say it” (Creswell, 2007, p. 40). Qualitative methodology will allow for a comprehensive view of visitor meaning-making embedded within personal, physical, and sociocultural contexts in a museum.

This qualitative research study employed a case study methodology where “an in-depth description and analysis of a bounded system” (Merriam, 2009, p. 40) occurred. Case study researchers have a “sincere interest in learning how [people] function in their ordinary pursuits and milieus” (Stake, 1995, p. 1). In order to obtain an understanding of the meaning visitors made of *Body Worlds*, this research study used multiple data entry points to access information from participants (i.e., interviews, comment books, observation) (Stake, 1995). The uniqueness of the *Body Worlds* exhibition makes it a “particularistic” case study, with the depth of visitor responses contributing to a
“descriptive” account of this particular case, with the intent to provide a “‘thick’
description of the phenomenon under study” (Merriam, 2009, p. 43). Based on this
description of visitor responses to *Body Worlds* a comprehensive understanding of the
meaning visitors made and how they responded to this controversial exhibition occurred.
Visitor responses to this exhibition also shed light on the changing role of the science
centre and the nature of its exhibitions.

*Body Worlds* may be considered a bounded case as the medium and layout of
space used in this exhibition offers the opportunity to “examine functioning” (Stake,
2006, p.1). Merriam (2009) suggests that boundedness may be assessed by examining
how finite data collection may be. In this case, only visitors who attended *Body Worlds* in
Ontario were included in this study so that they could describe their experiences while in
this specific exhibition. There was an end to the number of observations and people who
could be interviewed due to the limited showing of this exhibit, supporting the notion that
*Body Worlds* was a bounded system, and hence a case (Merriam, 2009). As *Body Worlds*
is a travelling exhibition, future case study research could explore visitor responses in
other non-Western countries contributing to a more comprehensive understanding of the
visitor experiences across cultures with *Body Worlds*.

In many ways, *Body Worlds* could be considered an atypical science centre
exhibition (limited hands-on experiences, static objects, curiosity cabinet display).
However, Abramson (1992) identifies the usefulness of such atypical cases:

First, since such data are rare, they can help elucidate upper and lower boundaries
of experiences. Second, such data can facilitate… prediction by documenting
infrequent, non-obvious or counterintuitive occurrences… And finally, atypical
cases… are essential for understanding the range or variety of human experience… (p. 190).

This unique case study may be considered instrumental in that it has the potential to offer “insight into [a] question by studying a particular case” (Stake, 1995, p.3). The context becomes important in the instrumental case study and the “case serves to help us understand phenomena or relationships within it” (Stake, 1995, p.77). The intent of this case study is to use an unconventional science exhibition to contribute to existing understanding of the meaning visitors make while at the museum, as well as shed light on the changing role of the museum and the nature of science exhibitions.

Case study research draws on empirical, naturalistic research to document and analyze case experiences through multiple methods (Stake, 1995). Researchers are largely “non-interventionists” and so using naturalistic inquiry ensures the research setting remains unaffected by the researcher (Stake, 1995, p. 44; Patton, 1980). In this study I unobtrusively observed and created field notes of visitors as they engaged with the Body Worlds exhibits. This allowed for the observation of “naturally occurring event[s], program[s], relationship[s], and interaction[s] that [have] no predetermined course established by the researcher” (Patton, 1980, p. 41). By not approaching visitors while in the Body Worlds exhibition, visitor experiences with the exhibits remained unaffected. Instead as visitors freely moved through the Body Worlds exhibition, their responses to the exhibits, docents, and peers, were observed and recorded. Semi-structured interviews enriched data collection with the telling of visitor stories. More will be said about the methods I used in the following section.
Methods

Case study methodology draws upon multiple methods. This study included the research techniques of: semi-structured interviews, observational field notes, comment books, and documentary material collection in order to determine visitor responses to the Body Worlds exhibition.

Interviews. The purpose of the interview is to “obtain descriptions and interpretations of others” (Stake, 1995, p. 64). Semi-structured interviews were conducted with visitors to the Body Worlds exhibition as they exited the display. Pilot interviews (Merriam, 2009) were conducted to clarify if questions needed rewording, further clarification, or produced useless data. As requested by Body Worlds management, visitors were not approached to participate in interviews until the end of their visit when they had exited the exhibition and were guided into the gift shop.

A purposeful sampling approach (Creswell, 2007) was used, drawing participants from those who attended Body Worlds & The Story of the Heart at the Ontario Science Centre, during the winter of 2009/2010. Visitors were approached with a personal introduction and an invitation to participate in a short 10 minute interview. In total, 82 visitors were invited to participate and 80 of those visitors agreed. Visitors were asked to volunteer their age range and occupation; at no time were visitors asked to share their names. Visitors were encouraged to share their thoughts around broad themes of expectations, motivations, and experiences within the exhibit (see Appendix A for interview protocol). Participants were assured anonymity and their right to cease the interview at any time. Forty-six (46) interviews were conducted at which point it was decided that saturation had occurred (Thomas, 2006). In addition to conducting
interviews with independent visitors, small visitor groups also participated with the intent of eliciting participant dialogue enriching the data collection.

Participants. This study included a total of 80 interview participants (See Table 1). Visitors were approached and invited to complete a short interview at a nearby table. Young children and teenagers were not approached, however, some visitors between the ages of 16-19 did participate as they were present during interviews with their parents.

Table 1

*General demographic information about interviewed visitors*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Under 20</th>
<th>20 – 29</th>
<th>30 – 39</th>
<th>40 – 49</th>
<th>50 – 59</th>
<th>Over 60</th>
<th>Total</th>
</tr>
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<td>12</td>
<td>9</td>
<td>7</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>24</td>
<td>16</td>
<td>17</td>
<td>12</td>
<td>5</td>
<td>80</td>
</tr>
</tbody>
</table>

The largest category of participants (30%) were in their twenties. This could be due to interview times coinciding with the local university’s reading week. The remaining participants held a variety of occupations including: health care professionals, artists, service and clerical workers, trades people, administrators and managers. Three participants were retired, and one was a stay at home mother.

Field notes. Observation is a tool that allows the researcher to describe phenomenon as they occur in their natural environment in depth (Baker, 2006). The amount of observer participation in the scene can vary from highly involved to being unobtrusive and as blended into the background as possible. At the request of Body
management, I attempted to be as inconspicuous as possible while making field notes. Field notes were recorded during ten visits to the science centre from January – February 2010. Approximately 20 minutes would be spent observing visitors during each visit. Structured observation was used as a qualitative research approach to set predetermined guiding categories for observation (Baker, 2006). For example, I was interested in conversational patterns, topics, and questions discussed within visitors groups, or between visitors and docents. Physical manifestations of aversion or awe were also of interest as visitors interacted with the plastinates themselves. Specific orientation of groups around artefacts was documented as were interactions between parents and children. I was also open to observations outside of the predetermined categories. In this study, field notes served to supplement interview data, although the subjects of the field notes were not necessarily interviewees.

Visitor comment books. As visitors exit museum exhibitions, some voluntarily record their thoughts and opinions in public comment books. However, these sources of data often go untapped (Livingstone, Pedretti, & Soren, 2001; Macdonald, 2005). As visitors exited the Body Worlds exhibition many recorded their thoughts in comment books, making these “an available and cost-effective resource for evaluation, and a rich source of ideas about visitor concerns” (Livingstone, Pedretti, & Soren, 2001, p. 358). Permission from the Body Worlds curator to photocopy comments books was obtained and the curator was assured that comments would to be kept confidential. This large sample of 10 visitor books each contained approximately 2000 comments. Interview participants, may or may not have commented in the visitor books.
**Documentary materials.** “Documents are… a ready-made source of data easily accessible to the imaginative and resourceful investigator” (Merriam, 2009, p. 139).

Documentary material including pertinent quotations, pamphlets and exhibit set up were collected in order to explore *Body Worlds*’ design and purpose. A detailed map of the exhibition was recorded including detailed descriptions of plastinates, information panels and quotations. This map was hand drawn as photography or video was not allowed in the exhibition. It was anticipated that during interviews or in comment books, visitors could refer to exhibition material, and this material would serve to further enrich understanding of the visitor response. Pamphlets offered to visitors were also collected and the *Body Worlds* website was used for contextual information.

The use of multiple methods in this research followed a component design where the mixing of methods occurred at the interpretation phase of this research (Caracelli & Greene, 1997). Interview data was used as a primary source of information, and comment books and observations were secondary. Using multiple methods served to triangulate findings; however, it is acknowledged that the use of multiple methods may also produce contradictory results. Merriam (2009) suggests that the use of the above methods “allows for a holistic interpretation of the phenomenon being investigated” (p. 136).

**Data Analysis**

For this study, interview data was a primary source of data. Comment books and observational notes were secondary and were used to corroborate and support the results reported. Documentary material was primarily used to contextualize and describe the *Body Worlds* exhibition. This section will first describe how interviews were analyzed, followed by comment book analysis.
Analyzing qualitative data includes organizing it and reducing it into meaningful segments through coding (Creswell, 2007). Codes may then be organized according to broader themes and results displayed in tables, graphs or through discussion (Creswell, 2007). While data analysis may follow this general process, it is necessary to think of data analysis not as a linear process but rather as a spiral, one that circles at various stages to construct a robust thematic analysis of phenomenon (Creswell, 2007). Combined with a thick case description, thematic analysis contributes meaning to understanding participants’ experiences within a case context: in this case, participants’ meaning-making and experiences within the context of the *Body Worlds* exhibition.

Initially, data was organized with transcribed interviews bound and labeled alphabetically. Pseudonyms were assigned to ensure anonymity. Notes were kept immediately following interviews where pertinent thoughts or immediate impressions were recorded (Thomas, 2006). Interviews were read in their entirety to get an overall sense of initial codes and memos were kept in the margins describing key concepts and my thoughts (Thomas, 2006). An initial list of emergent categories were compiled through an inductive-deductive iterative approach (Patton, 2002), which involved comparing initial themes to contexts and factors within the Contextual Model of Learning (Falk & Dierking, 2000). Summary sheets were created for each transcribed interview to assist subsequent analysis (Miles & Huberman, 1992). Some portions of text were coded with multiple categories. With the eventual development of themes, data were tallied in order to track theme frequency. In addition to the tallies, representative quotes were identified and recorded for each theme.
Following initial organization, analysis moved into the “describing, classifying and interpreting loop” (Creswell, 2007, p. 151). Semi structured interviews were analyzed both inductively and deductively using categorical analysis to refine and develop emergent themes. “Both categorical aggregation and direct interpretation depend greatly on the search for patterns. Often, the patterns will be known in advance, drawn from research questions, serving as a template for analysis. Sometimes, the patterns will emerge unexpectedly from the analysis” (Stake, 1995, p. 78). Initially, for research question (a) Within the context of the *Body Worlds* exhibition what meaning do visitors make and how do they respond to the exhibits?, deductive analysis was guided by using the eight factors of the three contexts of Falk and Dierking’s (2000) Contextual Model of Learning as codes (a discussion of the factors are presented in the literature review). Deductive analysis also occurred using Falk’s (2006, 2009) five identity-related motivations to loosely categorize reasons for visitors to the *Body Worlds* exhibition. However, I was simultaneously inductively coding allowing for other themes to emerge that were specific to the visitor experience with *Body Worlds*. It was expected that emergent categories would align loosely with those of the Contextual Model of Learning, and most categories did. Visitors’ shared experiences were first and foremost personal; with physical, and sociocultural contexts discussed as secondary elements to their experience. Initially organizing data using the factors from the Contextual Model of Learning helped to shed light on gaps and preferred contexts.

Analysis for research question (b) What tensions and issues arise for visitors?, was also both deductive and inductive, as a previous research identified visitor discord with the exhibition (Moore & Brown, 2007; Walter, 2004a). Themes also emerged when
visitors discussed their identified issues and tensions with the exhibition. When seeking to answer research question (c) What does this type of exhibition convey about the changing role of science centres and the nature of their exhibitions?, analysis was both inductive and deductive as I sought to explore visitor’s understanding of the role of the museum and the nature of its exhibitions. Initial codes were created based on current visitor conceptions of the science centre (i.e. a place for hands-on learning, a place for children), however, others were allowed to emerge (i.e., the science centre as a place for science and art).

Thematic coding was applied to the interview data using a constant comparative method (Glaser & Strauss, 1967) that involved multiple reads of the transcripts and a greatly evolved set of categories and themes. “The purpose of the constant comparative method of joint coding and analysis is to generate theory” (Glaser & Strauss, 1967, p. 102). Four stages are involved in the constant comparative method. To begin, Glaser and Strauss (1967) identify the first step to include comparing incidents located within categories to one another. Here, as the researcher coded transcripts, previous incidents of the code were compared to the present code. This constant comparison of incidents allowed for the generation of theoretical properties (Glaser & Strauss, 1967). At times, I would meet to discuss and refine categories during this early stage of coding with the research team to engage in “check-coding” in order to clearly define codes and address inter-rater reliability (Miles & Huberman, 1994).

Next, as properties of codes emerged, incidents were no longer compared with incidents, but instead, incidents were compared with the developed code properties (Miles & Huberman, 1994). Following an initial set of descriptive codes more focused
coding occurred wherein previous codes were collapsed into larger ones. Table 2 presents a summary of thematic coding for interviews beginning with the contexts of the Contextual Model of Learning and the initial emergent codes. Some of the initial codes were expanded upon to become more detailed and descriptive sub-themes (e.g., Narrative and Family Connections code became autobiographical stories, work related stories and family related stories). These sub-themes were then later collapsed into a theme that was more encompassing and captured the spirit of the sub-themes.

Table 2

Summary of Thematic Categories for Research Question (a)

<table>
<thead>
<tr>
<th>Contextual Model of Learning Contexts</th>
<th>Initial Emergent Codes</th>
<th>Emergent Sub-Themes</th>
<th>Collapsed Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q(a). Within the context of the Body Worlds exhibition what meaning do visitors make and how do they respond to the exhibits?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>Narrative and Family Connections</td>
<td>Autobiographical Stories</td>
<td>Narratives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work Related Stories</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Family Related Stories</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>Validation and Reinforcement</td>
<td>Smoking</td>
<td>Validations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diet and Exercise</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Health</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>Transposing and projecting Connectedness</td>
<td>Transposition onto Self</td>
<td>Transpositions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transposition onto Family</td>
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<tr>
<td></td>
<td></td>
<td>Transposition onto Society</td>
<td></td>
</tr>
<tr>
<td>Mindfulness</td>
<td>Awareness</td>
<td>Reverence</td>
<td></td>
</tr>
</tbody>
</table>
The largest number of themes fell within the personal context of the Contextual Model of Learning. A detailed description of the collapsed themes and their sub-categories will be described in the following chapter.

While I undertook the first two steps of the constant comparative method at times in tandem with the research team to address inter-rater reliability, I completed the third step in the constant comparative method - delimiting the theory, independently (Glaser & Strauss, 1967). As themes emerged, I began to compare them with the contexts in the contextual model of learning in order to seek gaps or identify more prevalent contexts. In
addition, Falk’s (2010) identity related motivations also emerged in the data. I was able to represent the visitor experience in a controversial museum exhibition by continuously comparing and refining themes: “By reduction... the analyst may discover underlying uniformities in the original set of categories or their properties, and can then formulate theory with a smaller set of higher level concepts” (Glaser & Strauss, 1967, p. 110). The fourth step in the constant comparative method - writing theory, will be presented in the discussion section that follows the results for each of the research questions.

Analyzing comment books involved photocopying two comment books in their entirety, and only pages with substantial comments were photocopied for the remaining eight books. Comment books were sorted and analyzed qualitatively (Livingstone, Pedretti & Soren, 2001). Based on Livingstone et al.’s (2001) method, visitor comments were sorted into two categories: useful and not useful (profanity, graffiti, signatures, one word expletives – which were not considered to offer insight into the research question for this study, but maybe useful to future studies). Book 3 and Book 8 were tallied in their entirety, as one was a completely full book, while the other was partially filled; about half of the visitor books included all pages with comments. Useful comments were substantive in nature and included visitors responding to the exhibition sharing their thoughts. In total, Book 8 included 2830 comments, with 2099 (74%) being useful, and 731 (26%) deemed not useful. Book 3 which was partially filled included 1528 comments, with 1279 (84%) being useful, and 249 (16%) being not useful.

Within the useful category, categories were first coded descriptively looking for key words (Miles & Huberman, 1994). Comments were normally short (from a few words to a few phrases) however, while comments were brief, meaningful patterns did
emerge (Livingston et al., 2001; Macdonald, 2005) and descriptive codes gave way to a broad set of emergent themes. I also coded deductively using the themes from the interview data. Prevalent to comment books were the themes of spirituality and religion, and sexuality.

During the analysis phase, observation notes and documentary material were used to triangulate the data. Here observation notes were primarily used to corroborate findings. Documentary materials were used to further contextualize the visitor experience. For example, if an interviewee commented on a specific quotation on the wall or exhibit, I was able to offer the reader further detail and description of the visitor experience by consulting and reporting on these materials.

The descriptive nature of the first two research questions invited visitor responses to the exhibition while the third research question drew upon connections between visitor responses and implications for science centre exhibitions. In order to enhance visitor meaning-making in science centres, all questions complement one another to ensure a comprehensive view of the visitor experience and meaning-making.

**Data Validation**

When considering validity, Maxwell (2004) describes it as “a goal rather than a product: it is never something that can be proven or taken for granted” (p. 105). Ratcliffe (1983) describes how data requires an interpreter or translator. When considering qualitative research, “human beings are the primary instruments of data collection and analysis.... We are thus ‘closer’ to reality than if a data collection instrument had been interjected between us and the participant” (Merriam, 2009, p. 214). As a result, due to this rigor, internal validity is a strength of qualitative research (Merriam, 2009).
However, it is important for the researcher to position him/herself and reflect critically on his/her role as a researcher. Making perceptions, assumptions and biases clear may allow the reader to more clearly understand how the researcher came to particular conclusions (Merriam, 2009).

In order to enhance confidence in data interpretation, a number of strategies were employed in this study. First, the use of visitor comments, as well as field notes and documentary materials, allowed access to a wider audience. This wider access served to promote triangulation when compared with interview data (Macdonald, 2005). In this way, the additional sources of data were used as corroborating evidence for a particular theme or interpretation (Creswell, 2007). Comments and field notes served to support or contradict themes found in interview data. Using multiple methods served to strengthen similarities and differences that existed in the data (Macdonald, 2005).

Next, adequate and continued engagement with the data enhanced validity as the researcher must get as “close as possible to participants’ understanding of the phenomenon” (Merriam, 2009, p. 219). Interviewing participants until the point of saturation, where the same type of information is being relayed, demonstrates that no new ideas are emerging. Also, observing participants in a natural setting reflects life experiences more fully than observations conducted in a laboratory.

Where possible, investigator triangulation with the research team was used to confirm data analysis. Investigator triangulation allows for alternative interpretations to emerge (Stake, 1994) and provides opportunities to discuss the plausibility of findings (Merriam, 2009). Patton (2002) suggests that validation may also be enhanced by having triangulation analysts who analyze data separately and then join to compare their
findings. Meeting regularly with the research team allowed for feedback and confirmation.

**Ethical Issues**

Standard ethical procedures were employed throughout this study. Ethical approval was obtained through the Ontario Science Centre and the OISE/University of Toronto Research Ethics Board. Permission to conduct research with *Body Worlds* was also obtained through *Body Worlds* management staff.

Participants in this study were approached as they entered the *Body Worlds* gift shop, as *Body Worlds* management did not want visitors disturbed prior to or during their visit. The researchers wore visible nametags with their names and the OISE/University of Toronto logo present. The study was described to participants and participants were invited to partake in a 10 minute interview at a nearby table. Verbal consent to participate in this study was obtained. Participants were advised that they could stop the interview at any time, or they could withdraw their shared information at any time without penalty. Visitors were provided with the principal investigators contact information card.

Interview participants voluntarily donated their time and remained anonymous in this study. There was minimal risk to participants associated with their own personal level of comfort while engaging in the interview and each subject was informed of their right to terminate the interview at any time without reason. Once comment books were filled, *Body Worlds* staff locked complete books in a cupboard. Photocopies were made of these comment books, and these photocopies were also kept in a secure locked cupboard, along with field notes and interview transcriptions, where only the researchers...
could access them. When referencing the data pseudonyms were used to ensure anonymity of the participants.

Visitors participating in the interviews could benefit from this study as they had a place to discuss their experience with this thought provoking exhibition. In sharing their experiences, participants may have made connections that would contribute to their meaning-making and to the overall and lasting impact of the Body Worlds exhibition. The Ontario Science Centre may be able to use findings to inform later exhibitions and selection of appropriate exhibitions for the Science Centre. The presence of interviews can be seen as an extension of the experience at the Science Centre.

Limitations

This study focused on one iteration of Body Worlds & The Story of the Heart, presented at the Ontario Science Centre. Variations of Body Worlds have been presented in over 45 cities throughout the world and have accrued over 34 million visitors. As such, results in this study may not necessarily be generalizable to Body Worlds as a whole. Different cities provide different contexts and visitor demographics may vary in significant ways. A similar study of other Body Worlds exhibitions at science museums around the world could yield findings different from those reported here, and provide interesting comparative data.

Another limitation to this study existed in the collection of data. Body Worlds management was specific in how field notes were to be collected in this study. At no point were visitors to be disturbed while inside the exhibition, and visitors could only be approached to participate in interviews at the conclusion of their visit once they entered the gift shop. Future iterations of this study could explore examining participants’
interactions with exhibits throughout the entire display and follow up with an interview. This would ensure a more comprehensive understanding of the process of meaning-making and the visitor experience, as suggested by Allen’s (1997) sociocultural framework. In observing the “moment-by-moment interactions of visitors with each other and with objects… we can ‘zoom in’ on visitors' learning processes by looking at their words, expressions, and gestures in great detail, or we can ‘zoom out’ to get a more holistic view by following their activity patterns through an entire visit” (Allen, 1997, p. 8). Future studies with a focus on process may shed light on how visitors make meaning of science exhibitions.

In spite of these limitations, the results in this study are valuable as they have been analyzed from an educational perspective. Most of the research that has been conducted with Body Worlds, has been positioned within an ethical, medical, or feminist framework. Furthermore, this study provides insight into how visitors’ understand and make sense of an exhibition that many consider controversial, or sensitive in nature. This study sheds light on the visitor experience as they engage with static and quiet objects, and considers the interplay across personal, physical and social-cultural contexts. The results in this study may further enrich existing work in the area of science representation and exhibition design, with the goal of maximizing accessibility and meaning-making for the visitor.

**Summary**

This chapter described the methodology that governed this study, and methods used to collect data. Prior to describing the methodology and methods I positioned myself within this research. I identify with a postpositivist epistemological orientation which
relies on a mind dependent, subjective truth, with multiple realities (Phillips & Burbules, 2000). Postpositivists acknowledge that a reality exists; however, it is constrained by human limitations (Mertens, 1998). Researchers cannot come to reality with one hundred percent certainty; however, they come closer to the truth by eliminating or discrediting alternate theories (Mertens, 1998). Postpositivism thus offers an appropriate epistemological orientation for my work, as theoretical frameworks guide and structure my research methodology.

This qualitative research study employed a case study methodology of a bounded system (Merriam, 2009). Case study researchers have a “sincere interest in learning how [people] function in their ordinary pursuits and milieus” (Stake, 1995, p. 1). In order to obtain an understanding of the meaning visitors made of Body Worlds, this research study used multiple data entry points to access information from participants (i.e., interviews, visitor comment books, observation, and documentary material) (Stake, 1995). This unique case study may be considered instrumental (Stake, 1995) as the intent is to contribute to existing understanding of the meaning visitors make while at the museum, as well as shed light on the changing role of the museum and the nature of science exhibitions.

Data analysis in this study relied on thematic coding (Glaser & Strauss, 1967). For research questions (a) and (b) both an inductive and deductive approach was taken to allow for Falk and Dierking’s (2000) contexts and subsequent factors required for meaning-making to organize data, while simultaneously allowing themes to emerge within each context. Data analysis for research question (c) followed the same approach, with deductive codes established through examination of the literature. Using multiple
sources of data served to corroborate themes that emerged largely from interview data (Creswell, 2007).

In order to support data validation, the use of visitor comments, as well as field notes and documentary materials, allowed access to a wider audience and served to promote triangulation when compared with interview data (Macdonald, 2005). Using multiple methods served to strengthen similarities and differences that existed in the data (Macdonald, 2005). In addition, interviews occurred until the point of saturation, where no new ideas are emerging. Also, participant observation took place in a natural setting reflecting life experiences more fully than observations conducted in a laboratory (Merriam, 2009).

*Body Worlds* is a unique exhibition due to its use of human cadavers as artifacts to educate the public on issues related to health. Considering this medium, controversy has surrounded the exhibition, but over time this seems to have subsided. This study explored visitor responses to the *Body Worlds* exhibition 10 years after it was first introduced into the museum circuit. It examined visitor responses to this traditional display of science as cabinets of curiosity, rather than the hands-on interactive displays that are commonplace at the science centre. In a day and age when technology is integral to people’s lives and functioning, where multitasking and stimulation abound, visitor responses to a static and quiet display of objects was examined. In spite of science museum transformation to interactive science centres, *Body Worlds* reverts to the traditional approach of display, but does present the contemporary issue of health related practices through a controversial exhibition. How then will visitors respond to this unconventional exhibition, while staring...
death in the face? The next 3 chapters present findings and subsequent discussion for each of the research questions.
Chapter 5
Visitor Meaning-Making

In this chapter the findings and analysis for research question (a) will be presented, followed by discussion and implications. Recall research question (a):
Within the context of the Body Worlds exhibition, what meaning do visitors make and how do they respond to the exhibits?

Thematic coding of interview and comments from visitor books produced seven themes with numerous subthemes (see Table 2). All themes could be categorized as falling within the personal, physical, or sociocultural contexts included in the Falk and Dierking’s (2000) Contextual Model of Learning. These themes and subthemes are illustrated by quotes from the interview participants and supported by excerpts from visitor comment books and field note descriptions and observations. Visitor comment books and participant observations were used to triangulate interview themes, however, some themes emerged predominantly in visitor books including those of sexual representation, gender representation, and body image representation, which will be discussed in the next chapter.

Motivation for Attendance

Visitors were asked about their motivations and reasons for visiting the Body Worlds exhibition. Although responses varied, the majority aligned with Falk’s (2006) leisure identity-related motivations: explorer, experience seeker, professional/hobbyist, facilitator, and spiritual pilgrim. Of the five categories, the majority of visitors interviewed (44%) fell within the Explorer category; those who are curious and interested in exhibition content (Falk, 2006). Here visitors described their “interest” and “curiosity” in visiting the exhibition and a number shared their desire to “learn something.” Some
visitors expressed wanting to learn more about the heart, while others (especially students) wanted to enrich their learning from school.

The second largest category (20%) was the Professional/Hobbyist; visitors seeking content similar to their work or personal hobby (Falk, 2006). Visitors in this category described how their work or school subject matter motivated their attendance: “My wife is a nurse so she is really interested in the science of it. The same with myself, because of my background” (Ben, 40 – 49 year old, paramedic). Many students shared how the exhibition tied into their studies: “...next year I get into biology and chemistry so I wanted to learn more about the body to see if I was interested and I am (Ting, under 20, student). Connections to their workplace and school motivated the individuals in this category.

Fifteen participants (19%) described attending the exhibition for the purpose of “something to do this weekend” (Katia, 50 -59, administrative assistant). These Experience seekers were looking to fill their leisure time by attending a place they deemed to be important to visit (Falk, 2006). Included in this category were people visiting because they had received tickets as gifts or were celebrating a special event (i.e., birthday, Valentine’s Day). Some visitors indicated they travelled long distances to attend this exhibition: “It was a spur of the moment thing... I’m not from Ontario, so I’ve never been to the Science Centre” (Kasia, 20 – 29 year old, student).

A few of the visitors who were interviewed (10%) shared that their motivation for attendance was to create learning opportunities for their children or accompany their friends aligning with the Facilitator identity (Falk, 2006). Here visitors shared motivation in relation to their children: “Jimmy’s 14 and he has an interest in going into biology. It’s
one of the reasons that we came here” (Christine, 40 – 49 year old, project coordinator). Others attended in order to support their friends: “She always wanted to see it...” (Jake, 20 – 29 year old, student); “She told me to come” (Neeta, 30 – 39 year old, sales representative).

Finally only one person’s motivation for attendance aligned with the Spiritual Pilgrim category; those seeking a spiritual or restorative experience: “She’s trying to find the body and the soul and the evolution and creation issue” (George, 40 – 49 year old, textile manufacturer).

**Contexts for Learning**

Falk and Dierking’s (2000) Contextual Model of Learning identifies that meaning-making is situated within three contexts: *Personal, Physical*, and *Sociocultural*. Each of the three contexts further include factors that support meaning-making. A detailed review of Falk and Dierking’s (2000) contexts can be found in Chapter 2. Below, themes emerging from the data in this study have been organized using the three contexts of the Contextual Model of Learning.

**Personal context.** While visitors were not asked specifically about factors that influenced their meaning-making, their responses did reflect the personal context component of the Contextual Model of Learning. Visitor comments classified as falling within the personal context were highly personal in nature and referenced visitors’ personal connections, prior experiences, and emotional responses to the exhibition. Below, the prevalent themes of narratives, validations and reinforcements, transpositions and reverence that were central to visitor responses are described.
Narratives. One of the most prevalent themes found within interviews was that of participants sharing personal narratives and family connections to the Body Worlds exhibition. Czarniawska (2004) defines narrative as “a spoken or written text giving an account of an event/action” (p.17). For the purpose of this research personal narratives were defined as spoken and written stories that were private and drew upon previous life experiences. Stories uncovered in this research included personal illness narratives (e.g., recollections of one’s own past surgeries and maladies), family history stories (e.g., stories of family illness and death), and work-related stories (e.g., connection to hospital patients cared for). In discussions with visitors, 46 participants who were interviewed (58%) shared such narratives, communicating one or more stories about themselves or family members in relation to what they had seen and experienced in the exhibition. Interestingly, a limited number of personal narratives were shared in visitor books. Within this category three narrative sub-themes were identified: autobiographical stories, family-related stories, and work-related stories. Each is discussed below.

Autobiographical stories. The most prevalent type of narrative shared was the autobiographical story. Here visitors shared personal stories of health-related experiences describing illnesses and treatments they received as well as addictions and health related behaviours. Visitor responses included extremely personal stories on sensitive topics including miscarriages, weight issues, death, and personal health concerns.

Personal illness narratives included stories of cancer, diabetes, heart conditions, blood pressure, joint replacement, arthritis, and appendicitis. Here, visitors candidly described their own ailments and their personal connection with the exhibition. “I’m a cancer survivor, so I was looking at… where I had the cancer... That was my sort of
personal emotion attachment to the thing, that’s where it kind of came into play with me (Katrina, 40 – 49 year old, teacher). “This was very interesting. I’m a 37 year old man who had a stroke back in ’06,” one visitor shared in a comment book (Book 1, p. 106). Trevor, a 40 – 49 year old textile manufacturer, described his connection, “in my case I have a heart condition and I can see some of the valves and how they have the different treatments for heart issues. What I found easily the most interesting part because it hits home. It’s a personal thing.” Here, visitors identified how they personally connected with the exhibition.

Many visitors shared stories of their personal addictions including smoking and eating habits. Mick, a 20 – 29 year old salesman described his smoking addiction and his connection to the exhibition:

...on the smoking thing, and right when you walk in it starts talking about the heart and I mean, it was instantly, we both went … “oh, oh, here we go. This is going to mean something to us.” So there was a lot of thinking... I’ve smoked now for 14, 15 years. A long time, and I’ve tried to quit in the past, but I’m really focused on it this time … really. I just kept coming back to that, while in there.

Wondering, how close do my lungs look to those lungs that are completely black. Karen (40 – 49 year old, police dispatcher), Jen (40 – 49 year old, customer service rep), and Joanne (50 – 59 year old, clerical worker), similarly spoke about their own addictions and wondered about how their lungs look after years of smoking.

Personal reflections related to health-related practices emerged through discussions. Here, visitors spoke about how their experience with Body Worlds reminded them of their personal eating habits. Bob, a 40 – 49 year old truck driver said, “I’m once
again reminded that I’m a little on the heavier side and I shouldn’t be, but that’s going to be an ongoing struggle with me for a long time, is my eating. And eating at weird hours, etc.” Claudia, a 40 – 49 year old, veterinarian described her need to continue eating healthy, “I’m vegetarian, but... I eat ‘fast foods.’ So, I need to cut out the junk. I can still get plaque as a vegetarian.”

The fetal section evoked highly personal responses as several parents, particularly mothers, spoke of the challenges of conception and recalled when their own children were in utero or newborn. Margaret, a bookkeeper in her forties, shared, “It was personal to me because I’ve had a number of miscarriages, and seeing that is... it was really touching and fascinating to think how humans develop... within weeks.” Christine, a project coordinator in her forties, spoke of her connection to the fetal exhibit, and “especially having had a child grow in you, it’s really looking and saying ‘wow, that’s what he looked like.’”

*Family-related stories.* Visitors shared stories of connections to family members and close friends. Examples and memories of family illness and their health-related issues included speaking of injuries, smoking, pregnancy, eating habits, and exercise. Karen, a police dispatcher in her fifties, shared that her “...father has had the stents put in, and so it’s very relevant to the things that you know people experience.” Parminder, a corporate communications worker, aged 40 – 49, spoke of her family connections, “When you saw anything that had to do with any condition they [parents] had. ‘Oh, look at the knees with the arthritis’, because my mother’s knees bother her.” While some participants shared brief connections to the family, others used detailed conversations to describe family
health. For example, Mick and Bianca, both 20 – 29 year old sales consultants, entered into an in-depth dialogue surrounding the kidney transplant undergone by Mick’s father.

Although many visitors described their family connections with relative ease, some were unhappy or sad with seeing displays that reminded them of illnesses they had directly or indirectly experienced. Bonnie, a public transit operator, aged 40-49 said,

I know a lot of people who are sick. I don’t want to be reminded of it. I don’t need a picture of it to know that they are sick. I know that they are sick. Do I want to see a sick lung, or liver, or something? No. I didn’t come for that purpose... I had four people die of cancer last year. I didn’t want to look at that stuff. Quite honestly, I didn’t think I’d be looking at that.

Bonnie identified that she had not expected to see diseased organs on display; instead she thought that the exhibition would include only healthy bodies. Jim, a 50 – 59 year old retiree expressed sadness as he described how the fetal section reminded him of his brother who had passed away:

It made me think … the baby one coming back to me, I thought of my little brother that died, he was premature, so he died, and that’s why that one really interested me a lot, because it was just sort of … he died at about 7 months. Now I roughly know … I was about 5 years old when he died. I’ve never forgot it.

Some visitors became visibly saddened or moved. For example when speaking with Ellie, a 50 – 59 year old nurse, and her daughter Mia, a 20 – 29 year old sales support worker, Mia became upset, even tearful, when discussing parts of the exhibition that she found disturbing, relating this to her father’s passing. Mia revealed, “My dad died of cancer and the smoker system and all that was... [visitor cries] I would have liked
to have been forewarned. It was really disturbing.” Another visitor, RoseAnn, a 50 – 59 year old volunteer resource coordinator, spoke of her on-going struggle with weight management, sharing that she still had a long way to go before she reached a healthy weight. This was an emotional subject for her and she too became tearful as she recalled her story.

School and work-related stories. About 15% of interview participants in this study worked in health care or as medical professionals, and 25% identified themselves to be full time students. Within the medical professional group, a number of participants made explicit connections between patients they had worked with or procedures they had seen and their experiences in the Body Worlds exhibition. Sally, a nurse in her twenties, explained, “I’m a cardiac nurse, so I kind of felt connected to parts on the heart and the pacemakers, because with the different examples they used, I could connect them in my head to different patients.” Kay, a critical care nurse in her thirties, described the connections she saw between the exhibit and her work in the hospital: “Clinical relevance working in critical care, I see a lot of procedures and different illness, so it’s kind of interesting to see what we do on the outside, how it relates to what goes on in the inside.” Other health care workers made general connections between what they had seen in Body Worlds and what they had seen previously at work. “As Athletic Therapists we really appreciated seeing muscles and joints in action! It’s a great learning tool!” (Book 2, p. 7). Sally also speculated on how the exhibition might influence her the next time she is in the operating room: “Going into work, the next time I have someone’s open chest in front of me, I’ll be looking around in there a little more inquisitively.”
Students described their connections to their studies in the areas of: nursing, biochemistry, psychology, health science, anthropology, kinesiology, forensics, and general high school science courses. Many shared stories about how the exhibition helped them with their studies. Celia, a psychology student in her twenties describes:

We’re all pre-med students so I think that anything that kind of helps us along the way, no matter how juvenile… But the cool thing was, because all three of us are pre-med students, we all kind of know what’s going on in there, so it was nice to kind of all get together around this thing, and it would be ‘oh my gosh, look at the real thing.’

Sabrina, a 20 – 29 year old kinesiology student, described how the exhibition would have been more helpful during her first and second year of studies, and yet viewing it in her fourth year allowed her to “relate to it.” Furthermore, students spoke about how parts of the exhibition evoked emotion for them and yet they valued the educational potential:

Looking in the little test tubes with the babies, I guess, you want to call them. It kind of broke my heart a little bit, but at the same time, I’m excited that technology has gotten to the point where us students can actually learn about something like that. (Natasha, 20 – 29 year old, Biochemistry student)

**Validations and reinforcements.** In addition to sharing personal stories, visitors’ described how the exhibition validated past and future-oriented behaviours. Central to the theme of validation is the notion of confirmation. Here, beliefs, behaviours, and understandings were either confirmed or refuted as visitors reflected on their experience with *Body Worlds*. Visitor responses in this category were action-oriented; they involved the visitor practising or intending to make positive health-related choices, making
revelations about the influences of actions on their personal health, or resolving to make positive changes in their lifestyle.

Through discussion, 47 of the interviewees (59%) shared responses related to validation. Key words used by visitors making statements in this category included action oriented words such as: affirm, re-affirm, encourage, inspire, deter, convince, remind, solidify, reinforce, re-evaluate, and re-confirm. Some visitors spoke of positive changes that they had made in the past and how Body Worlds confirmed the benefits of these choices. Others spoke of changes they were planning to make. It should be noted that these assertions were self-reported and were not observed by the researcher. Within this category, three health-related sub-themes emerged: smoking, diet and exercise, and general health, with many commenting on all three: “It was really amazing to see how all body parts and organs work together to create our body and how careless people can be to this greatest creation by not exercising or by smoking or consuming bad food” (Book 1, p. 87).

**Smoking.** A section of the exhibition was dedicated to comparing healthy and diseased lungs; in particular those of smokers or those of non-smokers. An information panel titled “Ditch That Pack, Kick That Habit” hung above a display case with seven specimens presenting a healthy lung and various diseased specimens including; a smoker’s lung, smoker’s lung with emphysema and one with cancer, a cross section of a smoker’s lung with cancer, a thorax with tumour, and a lung with severe emphysema. These lungs were spoken of frequently with 78% of interviewees referring to them. Nav, a high school student, shared her thoughts on the colour of the lung, identifying a
potential misconception, “The black one is all black and the cancer one is black and white, so it’s better.”

Many visitors were affected by viewing the lung and reflected on their own personal or family experiences with smoking:

When I grew up a lot of parents smoked in the house and in the car. My father is a smoker, so the lungs were really interesting. The fact that somewhere down the road I might have a lung issue related to how I grew up. So those things are interesting to see, healthy lungs and smoker’s lungs and emphysema which is caused by being exposed to second hand smoke… Those are reality things. So it’s always interesting to see that and to be able to tell your children why they shouldn’t smoke and things like that. (Celine, 40 – 49 year old, secretary)

Visitors identified their prior experiences with smoking and intentions to quit: “It’s interesting because we’re both planning on quitting smoking, tomorrow, and it’s been a thought before coming here, but coming here … we’re both like, ‘yeah, definitely.’” (Mick, 20 – 29 year old, sales). Upon viewing the diseased lung Molly, a TTC driver in her forties, expressed her delight in quitting, “when I did look at the lungs I was like, ‘oh, thank god I quit smoking….’ I’m so proud I’m a non-smoker now.” One visitor commented in the visitor books, “Thank you Body Worlds! I will never smoke again!” (Book 1, p. 65). Joanne shared her concerns about her habit: “This is probably what my lung[s] looks like now. I mean I haven’t smoked for ten years but it’s going to take another ten years before I feel that I’m safe. I don’t feel safe.” Another visitor was observed leaving the lung display, reflecting on her own habit, saying to a friend: “It stresses you out” (Observation, Feb. 12).
Visitors also shared the value of the lung display as a way of convincing family members and friends to quit smoking. “Pierre’s father smokes, so when we were at the lung thing, my Claude said, ‘see Pierre, that’s what your dad’s lungs look like.’ And I’d say, ‘yup, your dad has to quit smoking’,” said Christine, a project coordinator, aged 40 – 49. Molly shared, “I said to my friend who’s a smoker, ‘make sure you look at the lungs.’” Those who had never smoked had their behaviours reaffirmed. David, a student in his twenties, said, “I’m glad I don’t smoke. Seeing the lungs was pretty shocking.” Another visitor relayed in the comment books how the exhibit reinforced his decision to not smoke: “An eye opening experience! Makes me appreciate my body that I take for granted. I should live a healthier lifestyle. I’m so glad I don’t smoke!” (Book 1, p. 83). A dad and his son were observed looking at the smokers lung. The father said, “Oh look at that, does this make you want to smoke?” His son, approximately 5 years old replied, “Oh no Dad!” (Observation, Feb. 12).

*Diet and exercise.* Another common theme shared was the importance of healthy living, specifically choices related to diet and exercise. Of the interview participants 41% discussed eating habits and exercise, and spoke of how the exhibition reaffirmed visitors’ pre-existing knowledge and behaviours. “I think it was more affirmation of what we already knew. My daughter is a third year dietician. She can tell you the fat content in everything you eat” (Vanessa, 50 – 59 year old, nurse). Other visitors described their intentions to begin making healthy food choices. Marianne, a financial planner in her forties described, “it just gave me a whole respect for the human body, and it does kind of make you think twice about what you’re gonna [sic] eat or drink... I want a healthy body, I want to take care of myself, I want to live a long time.” Estelle, a lunch room supervisor
in her fifties, shared, “I know there were a couple of times I went through there, and I thought, ‘okay, I really need to eat more salad,’ or, ‘we’re not going to have pasta for dinner tonight.’”

Visitors also responded to being confronted with the cross-section of the obese man. Ruby, a nurse in her fifties, explained, “When we saw the 300 pound guy, my daughter said, ‘we need to do the cross trainer more than twice a week, mom. We need to get on that cross trainer more.’” A visitor commented: “I would like the cross section of the obese guy inside my glass table so I’ll never get fat!” (Book 8, p. 58). Bianca described how the same plastinate made her reflect on her lack of exercise, “It makes me want to use my gym membership more too. Really, it sounds funny, but it’s serious. It just sits in my wallet, while I sit on the couch.” Visitors shared that the exhibition made them reflect on their health habits that they hoped to change. Ford, a graphic designer in his fifties, explained,

So, it’s.... time to re-evaluate one’s life and sort of look at the foods you eat and not do what a lot of the examples are there showing you. Here’s a heart that’s gone wrong or has something particularly bad with us, versus lungs that are healthy. All the different stages… what I take away from it is just be a little bit more careful about my own health and not do stupid things because right in front of you is what can happen. It’s not that it’s a shocker, but it’s one of those little reality checks … check that one off, okay, now I know… Fred over there that weighs that extra 50 pounds, I’ll be bugging him to just back off on the food and fatty stuff… life balances is basically what it presents to you.
A visitor commented on his new found motivation, “... it also inspires me to want to really get myself healthy again and also help others get healthy!” (Book 1, p. 100).

*General health and stress.* Interview participants (39%) and written comments described how the exhibition reminded visitors of, or reinforced their health-related practices. For example, Book 3 included the comment: “Good reminder that we should really take good care of our body” (p. 189). Here key words included *health*, *take care of*, and *stress*. Visitors relayed their appreciation and respect for the human body as an integrated working system. The exhibition encouraged some visitors to reconsider how they treated their own bodies and reinforced the need to care and respect it. Tim, an anthropology student, under 20 years old, commented, “Being able to see how complicated the body actually is, is a kind of eye opening experience to how you need to take care of your body.” In addition to reminders of healthy eating practices and exercise, visitors reflected on their spiritual and mental health, with some asserting that they were now keen to take up or continue meditation and yoga to reduce stress: “Just to reconfirm, whatever I’ve done. I exercise, being happy, yoga. That is the one that I should… continue” (Mina, 30 – 39, custom coordinator).

When referring to general health and stress, visitors referenced the quotations found on the walls of the exhibition and connections made to mood and a soul.

I found that there was a good connection between the physical exhibits... and then the displays about quotes from philosophers and from writers and general comments about the soul and the heart, and how the heart responds to stress and to not stress. And so there is a connection between how you feel and how you make yourself feel, and how physically healthy you are. So there is a bit of a soul
and a physical connection there… your soul is part of your mood and how you feel. (George, 40-49, Textile Manufacturer)

Linda, a 60 – 69 year old manager, also reflected on the quotes on the wall in relation to stress and her daily health practices:

The one I remember the most is the quote [located on text panels on walls] on happiness and stress, because I deal with that in my job a lot. I deal with a lot of stress, so I try and balance that with exercise at home, and not getting stressed out in other aspects of my life, and I’m planning to retire with the next couple of months. So I want to have more elements of happiness in my life because I don’t want to let the stress kill me before my time.

Visitor comments indicated that seeing the plastinates helped to raise their awareness of general health and to confirm the importance of taking care of the whole body: “I think we have to take care of our bodies and just try to get them in the best shape that we can because we will get more out of life that way (Celine, 20 – 29 year old, biochemistry student). Mick similarly proclaimed, “Wow, my body is not just something for me to abuse, and to take for granted! My body does a lot, and I owe it a lot more than I’m currently giving it.” Some visitors believed that this exhibition should be visited by school groups and children in order to educate and reinforce positive health related behaviours. RoseAnn, a 40 – 49 year old hospital employee, described, “To me it’s something that could almost do school tours, because it’s so informative for children to learn sooner in life to take care of themselves than later, especially in this day and age where we have so many obese unfit people.”
Transpositions. A large portion of interviewees (75%) conveyed explicit
correspondences to the plastinates on display, referring to their personal life experiences.
Here, the term ‘transposition’ is used to describe this connection. Transposition is defined
to be a mental transference of the sensory experience of the exhibition, in particular the
plastinates, onto oneself or others thereby allowing for the opportunity to make very
personalized meaning. This definition ascribes to vom Lehn’s (2006, p. 242-243)
suggestion that

We can begin to understand how visitors to Body Worlds make sense of
the exhibits by seeing them in the light of their own bodies and those of others.
They discover certain aspect of an exhibit, transpose them onto their body [or
someone close to them] and then talk [or write] about it in the light of the
discovery of the exhibit feature.

When describing transpositions participants used words that highlighted the visual
experience such as: looking and seeing. The visual experience was then often transposed
onto the visitor themselves, or others they knew, to create highly personal connections
with the display. Three different types of transpositions emerged: transposition onto the
self; transposition onto family and friends; and transpositions onto the general public.
Each will be reported on below.

Transposition onto the self. Visitors explicitly related specific elements of the
exhibition to themselves and their comments included examples of artifacts they were
able to describe in relation to their own bodies. Visitors spoke of how they could see
themselves in the plastinates, or the plastinates in themselves: “That’s me dad” (Zenia, 30
– 39 year old, office manager). Visitors described connections between plastinates and
their gallbladders, lungs, heart, knees, liver, body fat, sciatic nerve, spinal cord, spine, colon, appendix, and fetal development. A mechanic in his thirties named Anthony shared: “We’re trying to conceive too, so that was a neat little section to look through and see how things are going to [develop]... now we can mentally reference at certain points of it, what’s going on.” Jill, a mother in her twenties, commented,

    I liked the fetal part of it because I’m a new mom… I did a lot of research and stuff when I was pregnant with him, at the different growths, how big he was inside... so I found that fascinating, actually to really see it rather than reading about it.

Another visitor transposed the fetus onto herself relaying a deeply personal connection in the visitor comment book: “Thank you. It was hard but good to see what my babies looked like when they died inside me. It kind of gives me the closure I’ve been looking for for years” (Book 1, p.85).

Parminder shared her recent weight loss and described her response to the display of the obese man: “Last year I lost, personally, 91 pounds. So, I think ‘whew, look at the fat person. Wow!’ A lot of that’s gone, not all, I still have some to go.” Clint a wildlife removal specialist in his thirties transposed the diseased lung onto himself: “I quit smoking recently so I looked at the lungs. They’ll never be that pink, but hopefully they won’t be that black either.” “I’ve had part of my colon removed and so seeing that, and looking at that and saying, ‘okay I’ve that much of that missing.’ So yeah, it brings perspective to that also,” said Joanne, a clerical worker, aged 50 – 59, describing the transposition of the digestive system onto herself. Katrina, a teacher age 40 – 49, shared “I’m a cancer survivor so I was looking at.... where I had the cancer...‘wow, he took that
out.’” Celia, a student in her twenties described how seeing the exhibits further informed her understanding of the surgery she had undergone: “I had hip surgery, so seeing the bones and all that was cool for me. So I was like, ‘that’s what happened to me. That’s what it looked like.’” While the majority of visitors often compared themselves to diseased organs, a few transposed the mechanics of the body onto themselves. “When you see it in a statue form it was kind of neat because I started thinking, ‘okay, my legs are bent this way, now, that’s the way my muscle is moving’” (Bob, 40 – 49 year old, truck driver).

Some visitors also physically gestured to their own bodies as they described their personal transpositions. Christine pointed at her own body as she described her night pains:

Just being able to show things... and make it so easy to relate to, to identify. And say, ‘wow I can see that.’ Where you sit and go, ‘oh that’s there on me, that right there is what’s giving the pain at night on my left side.’

Similarly, Kinsely, an under-20 kinesiology student, motioned towards her abdomen while proclaiming, “The fact that we have so much in our body compressed into such a small area really fascinated me. It’s really neat that our intestines are 30m long. And it’s, like, how does that fit into this section right here?”

*Transposition onto family/friends.* Along with making transpositions onto themselves, participants also transposed plastinates onto family members. These transpositions related to family illnesses and ongoing health related practices. “I was just going through it thinking of different family members that may have had different issues. Some of them had strokes or heart attacks. It’s interesting to just see the anatomy of it...”
(Beth, 30 – 39 year old, nurse). Klara, a law student in her twenties, described transposing organs, specifically the diseased lungs, onto people she knew:

I guess where you have experience or you can relate to something… so if you know someone who has or has gone through it, then that would stir up emotions, because you would think that that’s been that person, or if you know a smoker, and that’s what that person’s lungs look like.

Many family-related transpositions involved visitors being able to identify and make meaning of the procedures family members had been through. Sophia, a health care aide in her thirties, transposed the exhibit onto her father, “My dad had a triple by-pass, and when I got to that exhibit you could clearly see where they did the procedure and how they did it.” Paul transposed onto his son, “My son had a concussion, you could actually point out how the brain works and you could show this is what happened.” A husband and wife couple were observed looking at a display of a torso with the nervous system. The wife transposed the spinal column onto her husband saying, “So when Dr. Turn talks about it pushing on your spine, that’s what he’s talking about. See how fragile it is? [pointing].” The husband does not respond, just looks (Observation, Feb. 27).

In addition to describing transpositions involving medical procedures onto family members, some positive and celebratory transpositions onto family members were shared. Christine, a project coordinator in her forties, transposed the fetal section onto her daughter-in-law, “She’s pregnant with their second, and I’m thinking ‘wow, there’s Riley, because we already know it’s a boy… there he is now.’” Mick described the emotion he felt when viewing the kidney:

... My father... he’s a transplant patient, so I got to hold a kidney in there. ‘Wow,
that’s what you had removed and then replaced!’ And, thankful to that kidney. Not that specific one, but to the kidney in general that saved my dad’s life...

Some visitors described family-related transpositions, connecting what they saw with negative health-related behaviours of family members. The diseased lung and liver, and the obese man, were transposed onto family members. Ken, a 50-59 year old reliability consultant, said, “We’ve got a daughter that’s a smoker and you just see the lungs and the development of cancer and stuff and you just shake your head.”

Transposing onto the general public. Visitors made much broader transpositions onto the general public using words such as: you, one, we, same, ourselves, everyone, and common. Typical responses were broad in nature and often referred to the exhibition and body as a whole.

I said to my sister when we were walking through and we were looking at what’s inside of each and every one of us that is walking around looking at the exhibit, that we all carry this. It’s a part of ourselves that isn’t visible to us. So, yeah, something that we have in common with all people. (Margaret, 40 – 49 year old, bookkeeper)

In these instances, visitors transposed what they were viewing onto the general public: “What I found interesting that I hadn’t anticipated was some of the medical prosthetics, the hip replacement, and particularly the mechanical heart. That people actually walk around with something like that in their bodies” (Colleen, 60 – 69 year old, scientific illustrator). A conversation observed between a father and daughter, had the father pointing to a portion of the body slice of the obese man and transposing it onto members
of the general public who are obese saying, “see that – all that is fat, and that ‘flap’ is the
flab that hangs over their pants” (Observation, Feb. 21).

Some visitors described how plastinates reminded them of human connections to
animals. Christine, a project coordinator in her forties, commented, “We saw the inside of
a rib, and I went ‘that looks a little too much like what we put on the barbecue,’ because
it is. It’s very similar. Rib of an animal, rib of a human. It’s the same.” While Claudia, a
veterinarian in her forties, described, “I’m a vegetarian, so I kept making comments … I
couldn’t help it that everything looked like meat and how can we eat meat, so … we’re
really not very different than animals.” Finally, some visitors commented on the
universality of the human body:

Realizing and understanding that we are just humans and under that skin it’s just
meat and we all look the same. And, it’s just that realization because our society
does not put enough emphasis on the fact that we’re all the same, that there is
nothing that differentiates you whether you’re different race, whether you’re
different height, whether you’re different gender. It’s just education - what’s
underneath. We all function the same. (William, 30 – 39 year old, photographer)

Reverence. Another theme to emerge among visitors was feelings of reverence, with 33% of interviewees speaking to this theme. While viewing the plastinates visitors
acknowledged that the exhibits were once live beings. A deeper appreciation emerged
where visitors produced reflective responses including words of: awe, appreciation, wow,
amazement and respect. The distinctiveness of this theme lies in visitors being reflective
about their own lives and mortality, with emotion being integral to this theme: “Never
expected an emotional response from something so scientific and educational” (Book 2,
p. 46). Visitors spoke of being reminded of the profound need to “treasure [their] existence” (Linda, 60 – 69 year old, manager) and to “value [their] own body and the miracle that it really is” (Margaret, 40 – 49 year old, bookkeeper). One visitor shared, “I just didn’t know what a miracle I am” (Book 1, p. 7), while another visitor recommended the exhibit: “A must for everyone and anyone who breathes and lives – essential education in the respect and treatment of our bodies our temples...” (Book 3, p. 21, emphasis in original). Describing the awe in the experience, one visitor commented,

The sense of awe and wonder holds you! The utter shock that you are viewing yourself and all of the human race connects you to your commonality. At the same time I cannot stop thinking how altruistic those people are to want to reach out to us in their final end... To teach us that we are one... The marvel of such perfection cannot be put into words, only visually can the message reach us.

(Book 3, p. 306)

Juanita, a lunch room supervisor in her fifties described how the medium itself was what made the exhibition meaningful: “I think the fact that everything was real. That was the whole amazing part of it. Everything is real...” One visitor wrote, “It was so phenomenal I was frequently moved to tears at the beauty of our bodies and how intricately designed we are. The Bodyworlds [sic] exhibit is so eye opening and inspiring. Thank you” (Book 10, p.20). Janusz, a political science student in his twenties, also saw the plastinates as people and feelings of respect arose: “I think when you are walking through this there is kind of respect... It’s kind of like this: It’s not just material. You kind of have a sense that you’re walking among people.” Mina shared, “That’s kind of sad to go through, but at the same time, all of the exhibits are from people, some animals. So
I’m sure there is some story behind each one, and you kind of reflect on that … You’d be humbled by it” (30 – 39 year old, custom coordinator).

Visitors shared their amazement at the workings and intricacies of the human body, and described their need to respect the body. “I’m amazed at what is inside of me. With this knowledge I will go forth and protect it [un]til the day I part this world. Thank you for an amazing experience” (Book 3, p. 75). Celine, a secretary in her forties said, “We know our body is amazing because it has the ability to heal itself.” While Parminder, a communications worker in her forties, shared,

We should respect our parts more and keep them working and clean and so on, through our lives, because we need them. We take it for granted. We really do, and looking at it and what a miracle it is, and how it works together, it just makes you be in awe of it. That it just comes together in everybody. How we are all born and it’s formed and comes and works so perfectly in all of us. It’s amazing.

Visitors also shared their experience of being confronted with their own mortality and spoke about death and dying. Morgan, an engineer in his fifties, spoke of how the exhibition reminded him of “...a sense of my own vulnerability, time clock, biological time.” Lana, a photographer in her thirties, said, “...going through the exhibit it makes you think about possibly death too.” Jesse identified how both “life and death is part of here [the exhibition]” (50-59 year old, reliability consultant). A visitor comment highlighted life as impermanent and the importance of valuing it: “May all beings benefit from viewing this exhibit. Know mortality, impermanence, and the value of human life” (Book 3, p. 87).
**Physical context.** When visitors are invited to recall their museum experiences, they often describe the physicality of the visit, i.e. things they saw and what they did (Falk & Dierking, 2000). This aspect is what Falk and Dierking (2000) refer to as the physical context, one of three contexts involved in the Contextual Model of Learning. The physical context included in the model incorporates physical factors of: advance organizers and orientation; design; and reinforcing events and experiences outside of the museum (Falk & Dierking, 2000, p. 148). While the visitors in this study were not asked to speculate on the physical factors that contributed to their meaning-making, their responses did refer to physical descriptions of the exhibition. Here, visitors spontaneously spoke of exhibition design and set up, experiencing the body in 3-D, and the multisensory experiences they engaged in. Each is discussed below.

**Design features of Body Worlds.** Coinciding with Falk and Dierking’s (2000) contextual cues, 77% of the interviewees commented on the physicality of the exhibition design and set up. Entering *Body Worlds & The Story of the Heart*, visitors met an entirely black hallway, with dim lighting except for one plastinate highlighted, kneeling holding a heart. The sound of a heart beat could be heard in the background. “And I think the whole setting of the thing is that it’s a little dimmed down, it’s not with flashing lights. It’s kind of like … the whole atmosphere is like a funeral home... It’s darker... There’s a seriousness to everything” (Janusz, 20 – 29 year old, student).

Visitors spoke of the exhibition layout as it progressed from simple skeletons to more intricate and detailed full body plastinates. Jim, a retiree in his fifties, explained, “Every room that you went to was just a little bit more graphic, a little bit more open, showed a little bit more than the first, so it sort of build you up to it in ways.” Bonnie, a
critical care nurse in her fifties, said, “I think both of them start out as tamer, easier to adjust to things, just showing bones and little pieces of things, rather than jumping and showing the larger pieces right away. So in that sense it’s good because it kind of eases people into it instead of shocking them right away.” When speaking of the plastinates themselves, some visitors noted that they looked different from what they had expected. Linda shared, “they look more plastic and rubberized than I thought they would which I understand is the process” (60 – 60, Manager). Mick identified how the plastination process made viewing the body more accessible: “And it’s shown in a really safe way in there too. Because there is no smell, because it’s not like there is anything dripping, there’s no real blood. So it’s very safe” (20 -29 year old, sales). Jill, a mother in her twenties, identified the realness of the exhibit:

I liked the fact that it was real people. It wasn’t just made up on skeletons. It was a real person that they cut in half kind of thing and really showing you what really goes on inside rather than trying to make it up.

In addition to full body plastinates, visitors commented on the display cases holding the individual organs and slices and being able to see comparisons between healthy and diseased organs, as well as comparisons between animals and humans. Stacy, a records specialist in her twenties, said,

It wasn’t only the fact that they actually just showed the bodies and the interior, and such, I also enjoyed the display cases, and how they would show the individual organ, and okay, this is a smoker’s lung, healthy lung, this is the heart of a calf, this is the heart of a full grown bull. So you could actually show
comparisons and things and everything like that. I liked that they actually took the
time to show you individually how it looks.

**Three-dimensional viewing.** Many visitors commented on the opportunity to view the human body three-dimensionally, as opposed to seeing it in two-dimensions on television or in books. Parminder, a corporate communications worker in her forties, said, “it’s just so different to walk around it and see it in 3-D versus watching a show about it on TV.” Similarly, Bob, a truck driver in his forties, shared,

I saw what I expected to see, but I also saw a bit more, and the fact is, that they had different slices of parts and organs and things that were separated, and some of them were dissected so that you could see exactly what it was in a more physical sense, instead of just on the printed page, or on a computer screen.

Sally, a nurse in her twenties, spoke of the usefulness of this exhibition for visual learners: “I think it helps people that don’t learn from books to see it in real life, and I think it’s cool to see all the little kids in there, just staring wide eyed … ‘that’s what we look like inside.’” Bonnie, a nurse in her thirties, shared, “I liked how the cases were kind of set back from... far from the walls, so that you could do a walk around and get all the different angles. So, instead of just looking at it from one angle you could really see everything...” Ford, a graphic designer in his fifties, contrasted the full body displays with the organs in display cases:

I went behind every single exhibit if I could, just so I could see it from all possible angles. That is just me though. But I appreciated the display formats. Whereas things that were encased in glass and you looked down on didn’t have the same
effect as having a three dimensional object that is aesthetically displayed for you, that you can walk around and observe.

Some visitors commented on how the various poses and contortions allowed for a detailed view of anatomy. Vanessa, a nurse in her fifties, described, “We kind of liked when they were configured. So, they had them twisted backwards or forwards or sideways and you could actually see all the muscles, because all of us studied that, and you actually could see them.” Hassan, a forensics student in his twenties, shared,

[You saw] positions that you don’t usually get to see. There was a torch bearer holding the torch up, and it was like ‘you can see the anatomy of the arm pit.’ Well, it’s like I never thought about the anatomy of the armpit needing its own display.

Mick appreciated the detail and the various systems:

By allowing us to see, not just the bone structure, which we’ve seen since we were little kids, but to see each little artery, to see the central nervous system completely removed from a body but still attached to a brain, and to see that laid out in front of you...[prompted] more respect than I’ve ever had before.

**Multisensory experiences.** In this exhibition, visitors were offered multiple entry points to access information related to the exhibits: visual, auditory, and kinaesthetic.

Visually, patrons could observe the plastinates themselves, choose to read quotations on the walls or informational panels next to the specimens, as well as view some multimedia on televisions or computer screens. Visitors could also choose to have an auditory guide for a small fee, and could handle three plastinated organs at a tactile table. Visitor descriptions of their multisensory experiences are presented here.
Visual. A few of those interviewed speculated on the usefulness of the print material: “I think that people who are going through who are a little overwhelmed by the physical objects, might find the posters a bit of a relief” (Colleen, 60 – 69 year old, illustrator). Mina, a custom coordinator in her thirties, identified, “… they do a very good job of having small quotations and small descriptions in between the exhibit’s big banners. And it seemed well placed to sort of temper your mood swings as you go through.” Hassan, a twenty year old forensic student, commented on the information panels:

There was lots of stuff on the cards. I was thinking about it, but then I read the cards and ‘okay, yeah, that’s what I thought it was.’ So someone who didn’t know anything could come up, read the card and get the same stuff out of it that I got.

Stephanie, a biochemistry student in her twenties, appreciated the quotations describing them as an added emotional element to the display: “They put emotion into the science, because usually science has no emotion. This is it, it’s pure fact, but it added that aspect of thinking deeper into science, not just research.”

Short video clips about the heart were also available to view and accompanied text. For example, next to a quotation “long may your heart beat” was a television showing a cartoon representation of a heart and the electrical current that moves through. Likewise an information panel titled “The Constricted Heart” describing angina and how blood clots and plaque may lead to heart attack was supported by a television showing the relationship between plaque and a blood clot. Interestingly only one person noticed the monitors and spoke about his appreciation for the technology: “the exhibits that were a little more interactive where they inserted a little bit of technology where you were able
to see visually, having monitors, projectors...” (William, 30-39 year old, photographer). Another visitor anticipated the opportunity to watch a movie while in the exhibit: “Well, I thought we were going to see a movie. Like I would have taken all that display stuff and put that in a movie or something, and then still have the display...” No visitors made explicit connections with, or comments of, the videos on display.

Many interviewees (67%) referred to the opportunity to actually “see” what they had previously experienced in textbooks, personal or family illness, or a work-related experience. This implies that visitors left the exhibition with a deeper understanding and visual of the human body: “Wow!! You don’t really know what you are until you see this!” (Book 6, p. 36). In many cases where visitors described their visual experience, they described how this led them to know or confirm previous information. Here, visitors explicitly described how viewing plastinates reinforced, expanded, or clarified prior knowledge. Beth, a nurse in her thirties, spoke of how manipulating the organs led to a deeper understanding for her:

Well, I was just going through it thinking of different family members that may have had different issues. Some of them had strokes or heart attacks. It’s interesting to see just the anatomy of it...or holding heart and the liver, so it was interesting to look at those things. Instead of actually just knowing it, and actually looking it and touching the heart. I thought that was pretty neat.

Bonnie, a nurse in her thirties, spoke of how viewing the blackened lung was more effective than being told that a smoker gets black lungs:

You can look at it in a book, but to actually come here and see it three dimensionally and be able to take your time and walk through and kind of look
around and see exactly, if I’m smoking, what is this going to do specifically....
People are going to tell you your lungs are black, but until you actually see it it’s not going to sink in and make any sense... So many people are afraid of their own bodies. They don’t listen to their own bodies. I think this makes people just a little more aware of what’s actually going on.

Ben, a firefighter in his forties, revealed his deepened understanding of cancer, and compared the smoker’s lung to his wife’s lungs. He said,

I think it will heighten their awareness of themselves. That’s what I found. It was kind of neat seeing the cancers, because you hear about it all the time, but actually to see it in there, it’s like “oh god.” And you from here in Canada where you don’t have smoking in restaurants and all this other stuff, and when you go down to the states, there’s still a lot of people smoking. And my wife is an ex-smoker. The kids give her the gears, “oh geez, is that the way your lungs look?” So, there’s relevance to it. And it’s hard to accept.

Ethan shared how viewing the fetal section allowed him to identify the size of his unborn child.

...because of our position in our family right now, my wife is pregnant with our second kid, the baby part was really neat. So, you’re going through that now... you’re watching the different stages. She’s 29 weeks. So it was neat to see the size of the baby actually right now... (30 – 39 year old, air purification)

Samantha, a high school student, described how the viewing the exhibits offered her insight into her grandfather’s knee replacement:
And when you go to the doctor and they’re trying to explain something to you and you’re like “what?” You have no idea what they are talking about. That helped a lot. Like when my grandpa is like “I have to get my knee replaced.” I had no idea what that would be like and then I saw and it’s “oh!”

**Auditory.** In addition to print material, visitors had the opportunity to move through the exhibit with auditory narration for a small fee. A number of visitors indicated that they did not realize this was an option until they entered the exhibition and saw others using it. They expressed their interest in hearing the additional information offered. Tim, an anthropology student in his twenties, shared, “it was really repetitive if you didn’t have the audio thing, I found, with the signs. It kept saying that it weighs 10 oz. It pumps so much blood... I don’t know what’s on the audio thing, but if you don’t have those I found it rather repetitive.” Some who rented the audio guide appreciated the supplementary content: “Awesome! Thank you science centre. I really enjoyed the digital headphones and speakers who helped explain certain functions of the body” (Book 3, p. 290). Some visitors described how the audio narration at times was overly simple:

And some of it, honestly, was very elementary. So, I guess it’s written for children to hear it as well. I could have done without some of the simple things ‘that we depend on our lungs.’ I know. When they went on to the specifics, if you wanted to hear more about the lungs, “press 86” that was the sort of thing I enjoyed. (Maria, 40 – 49 year old, veterinary masseuse)

Claudia, a veterinarian in her thirties, exclaimed “I would have preferred a more exciting voice. I felt like… he lost me … he was very monotone...”
Interestingly, although auditory cues assisted the visitor experience, what was noticeable in this exhibition was the absence of sound except for a heartbeat in the background. People spoke in hushed tones and often contemplated exhibits independently.

*Kinaesthetic.* Included in the multisensory experience was the opportunity for visitors to handle three plastinated organs: a heart, liver, and a kidney. Visitors to this exhibition could choose to pick up the organs or touch them. Some visitors spoke of this experience and indicated its importance in their meaning-making. Clint, a wildlife removal specialist in his thirties, described,

It’s definitely engaging that way. There’s a desk with a person in a lab coat and you could actually hold a kidney, a heart, or a liver. And I think that tactile sensation locks in that experience. Whereas looking at a book won’t be nearly as effective.

Beth, a nurse in her thirties, also described her appreciation for the manipulatives:

“...holding the heart and the liver... it was interesting to look at those things. Instead of actually just knowing it, and actually looking at it and touching the heart. I thought that was pretty neat.” Some other visitors spoke about their desire to handle more objects:

I would have wanted [it] more interactive, rather than just looking at things through a glass case and reading about it... because there seems to be this disconnect that that’s actually my body in that glass part there. Until you actually have your own physical interaction with it, these little games, and stuff like that out here. Then you realize, ‘oh, that is my body. That’s what goes on inside there.’ (Molly, 40 – 49 year old, transit operator)
Holding the liver at the tactile table allowed Stacy, a records specialist in her twenties, to understand how large this organ is. Stacy was able to compare a prior experience to the tactile experience to develop an understanding of the size of a human liver. “The liver is a lot bigger and a lot heavier than I thought it would be… my dad eats the liver from the turkey... It’s so much tinier. You’re not expecting something the size of both your hands.” Jake, a student in his twenties, described how the exhibits helped to clear up misconceptions: “For myself, there were some parts of the body, the anatomy that I thought I knew, but I realized was wrong. Like the location of the kidneys. Just little things like that so it cleared up some of my understanding of anatomy.” While many visitors appreciated the kinaesthetic table, others identified that the exhibition could incorporate further multisensory experiences. More will be said about this in Chapter 7.

**Sociocultural context.** Falk and Dierking’s (2000) Contextual Model of Learning includes factors within the sociocultural context which acknowledge that humans learn socially. Meaning-making occurs through group mediation and facilitated mediation by others (Falk & Dierking, 2000, p. 148). The sociocultural context of the Contextual Model of Learning is discussed in more detail in Chapter 2. Many of the participants in this study confirmed how opportunities to speak with a docent or with their peer group enriched their experience. Talk, for most visitors, was important to their experience and is described below. Other social-cultural factors influencing meaning made included themes of religious views, sanctity of life, and occupation-related identity. These are described below.

**Centrality of dialogue.** In line with social constructivist theory which posits that dialogue is central to meaning-making, 26% of the interviewees shared their
conversational patterns and experiences with the doctors and experts that were available for discussion throughout the exhibition. Some conversations could be categorized to be one way communication with mostly the expert speaking, while others involved dialogue between people. Joe, an apprentice in his twenties, described his experience with an exhibition docent: “Well, there was the one little table in there where… there was a scientist there and you could ask him ‘what this is...’” Juanita, a lunchroom supervisor in her fifties, found listening to the doctor’s explanation to be informative:

I found it pretty fascinating though, because at one point … it seemed like a small group of doctors or something, and I was kind of standing, listening, because they were adding some things. There was a man in particular saying “there’s the rotator cuff.” He seemed to be there with a group of students or something and just going in depth a little more, and I really enjoyed that too.

Several conversations were observed between the available doctors and children. In these instances the doctors were using the time to teach children about their bodies. For example, a young girl was standing in front of an animation of red and white blood cells when the doctor approached using it as a teachable moment:

Doctor: What are those red things?
Daughter: Cheerios!
Doctor: They are actually called red blood cells. White cells are like policemen, they fight the bad stuff.
Dad: They help you stay healthy!
Daughter: What about the red ones?
Doctor: They carry... Take a deep breath [girl takes breath]... Oxygen
Daughter: Oh, so the red ones carry the oxygen everywhere?

Doctor: Yeah

Daughter: Air goes through your mouth and the red ones carry the good air everywhere?

Doctor: Yes! Good for you! You’re smart!

Although only 26% of interviewees discussed talking to experts or doctors, hushed talk was everywhere. The majority of visitors were in groups, pairs, or family units and they engaged in dialogue as they made sense of their experience. Many visitors recalled conversations they had overheard while moving through the exhibition, particularly those where explanations to younger children were involved:

A lot of conversations that I overhead, I know there was one woman whose mother had had a stroke, and so they were discussing it actually with the kids, and saying, remember when nana had that happen, this is what happened. But she was really good because it didn’t go to this stage over here. And so I thought that was really, really great. (Christine, 40 – 49 year old, project coordinator)

Similarly, Katia, an administrator in her fifties, shared, “and you’ll get the full family going through and the parents are explaining... because you could hear it in there, the parents were explaining to the kids what this was as we’re going through it.”

Visitors also described dialogue they had with one another as they moved through the exhibition. Students and visitors travelling in groups with someone knowledgeable in the human body often described how their peers or expert in the field would provide additional information. Celia, a biochemistry student in her twenties, recalled the usefulness of moving through the exhibition with her fellow peers:
I’d know more about the brain, but you’d [speaking to her friend] know about the heart and stuff, and you’d know a lot about the bones. And so she was telling me and I was telling her, and you are telling me... It was good to go with each other because we all know different things about it all.

Bonnie, a critical care nurse in her thirties, likewise commented,

I was talking to [Clint – her friend] just because of my background, I know a lot of the physiology and anatomy stuff, so I’d kind of say, “oh, this is because of this and that.” And, I think, just playing narrator a little bit about some things.

Hassan, a forensics student in his twenties, referenced his peer Yiola, a health science student, “She knows that stuff more, so I needed her as a tour guide.” Many visitors identified talking with those they visited with throughout the exhibition. Ford, a graphic designer in his fifties, identified dialogue visitors were having and saw this as positive:

A lot of people in their 20s and 30s were comparing notes, talking about dads and moms and stuff, some of the conditions they have, some of the medical procedures they’ve been through and they can actually physically see it now in front of them. Or it’s “I know uncle Bob did this.” And it’s like “look it’s right there.” And they would talk about it openly and at least know what it was about which I was surprised at that because I just think open dialogue, it’s the best thing to have in just about any situation. So that was good.

Finally, Bob, a truck driver in his forties, who visited alone expressed wanting to converse with someone upon completion of the visit:

Oh, I made some comments to some people that were there. We’re in Toronto, so some people they look at you funny. Me, I’m from northern Ontario, originally, so
I talk to everybody. It’s different. If they don’t want to talk to you, you don’t sit there and give them a monologue, but if they do want to chat or say a few words, then so be it. It would have been nice to come with somebody and have somebody to discuss it with afterwards.

**Sociocultural influences.** In addition to talk between participants and docents, emerging from the data were themes reflective of visitors’ beliefs, morals, values, and identities as they made sense of the exhibition. These themes were salient and are discussed below.

**Spirituality and religion.** One of the largest categories to appear in the exit comment books centred on spirituality and religion. Visitors described the exhibition as proof of an intelligent design and God: “If anyone ever doubted that there is a GOD, this would change their minds” (Book 2, p. 71). Similarly, a comment in Book 7, page 18 said, “All the exhibits make our faith and believe [sic] in the ‘creator’ more firm. Yes there has to be a creator, who has planned the whole universe with so much care… ‘God is great.’” Visitors used the visitor books to comment on the exhibition as proof of an intelligent design: “How can you leave and still think we were just here by chance?” (Book 7, p. 83). Book 8, page 385 included the comment, “Definitely puts to shame the theory of evolution! So much detail, so much intricacy, we are indeed a marvel of creation!” A visitor questioned, “I found 2 references to evolution in the explanations frustrating, how can you look at these exhibits and not see an intelligent, purposeful designer?” (Book 10, p. 33). Some visitors spoke of the ability of the exhibition to make one believe in God: “Fascinating. It’s nice to know how wonderful we are build [sic]. Amazing, the body is a wonderful piece of machinery. Would make you believe we are
created by someone or something of genius” (Book 8, p. 435). Likewise, another visitor commented, “No one can even come close to recreating anything I’ve just seen in there. Only God. God is awesome!” (Book 6, p. 74). Visitors described their amazement and awe at the “… incredible depiction of the functional beauty, purposefulness and God’s hand in designing the human body” (Book 1, p. 83). Many visitors thanked the exhibition for reminding them of God. “Thanks! Just another reminder of how amazing God is!!” (Book 4, p.10). “Thanks for showing us God’s most amazing and beautiful creation!” (Book 1, p. 1).

Contrary to viewing the exhibition as proof of a maker, some visitors described the exhibition as evidence of evolution. A comment in Book 10, page 45, said, “Finally, public and scientific proof that we evolved and were not created by some imaginary being.” Another visitor commented on support for evolution, “Doesn’t it just make you marvel at the incredible complexity of our bodies. It is unbelievable to think that this complexity is a product of millions of years of evolution and natural selection” (Book 8, p. 219). Some visitors saw the similarities between animals and humans as proof for the theory of evolution: “We are just like animals, no difference at all, except for the curse of consciousness. Thanks gunther” (Book 5, p. 17). Without explicitly relating to God or evolution as correct, one interviewee shared how the exhibition would have them reflect further:

I probably have to reflect on it a little bit more, but I think I will. I mean you get a little bit deeper understanding of … evolution and things like that. It’s a whole other conversation to have on a night when you’re thinking about it in terms of how you don’t need your appendix, it’s an evolutionary thing, that’s been hanging
on. It brings a whole different conversation to it, right? How we got here, that kind of thing. (Ethan, 30 – 39 year old, air purification worker)

Visitor comment books seemed to be an avenue for visitors to express their faith. Various Gods were referenced in visitor books including: Allah, Jesus, Buddha, and Jehovah. “Thank Allah,” Book 8, page 198 reads, “I have never seen in 66 years of my life such a wonderful expression the nature has made for human being. The Allah is great.” Sparsely, comments of Satan were expressed.

Most often visitors described the positives of their faith. Book 1, for example, stated, “There is a way to escape from this impermanent body. Learn and practise the Supreme Buddha’s Dhamma” (p. 22). Likewise, Book 10 included the comment, “God said in Psalm 139 I am wonderfully made! How awesome you are God!” (p. 125); and Book 8, read “Glory to Allah, the creator” (p.452). In response to some of these comments, some visitors said, “There is NO GOD!” (Book 6, p. 3); “This ain’t church buddy” (Book 3, p. 309); “Screw off!” (Book 3, p. 309); and drew a picture of a satanic star (Book 1, p. 101), obviously describing their discontent with the religious views being expressed. Visitors also condemned the exhibition with comments reading: “You’re all sick, these were people!!! They had families who loved them! You’ll all burn in hell!!!” (Book 3, p. 134); “Jesus disapproves” (Book 2, p. 29); “Forgive us Father, for we know not what we do” (Book 3, p. 309); “This exhibit is a crime against god’s creation. He will smite you!” (Book 7, p. 64). Some visitors expressed the spirituality they found in the exhibition: “A religious experience for a non-religious person” (Book 3, p. 142).

Some visitors expressed how, in light of religious beliefs and practices, the exhibition could be potentially problematic for some. Colleen, an illustrator in her forties,
said, “I think it might actually disturb religious people who don’t want to acknowledge that we are flesh and blood.” Kasia connected the exhibition to her biology class and religious practices: “Like certain religion groups. I know, at school, if we were doing biology and that, some girls had to leave the room because of their religion, they couldn’t see that stuff.” Katrina, a teacher in her forties, questioned body procurement, “I guess too because of my faith. I kind of wonder, how did they get them [plastinates]?” Other visitors also questions how bodies were obtained, with reference being made to the controversy they had heard about bodies being obtained from China. “Where do these bodies come from?.. Are these bodies from prisoners or from people who really did sign, I’m not sure.” Angelo, a sculptor in his forties, identified a potential controversy to exist between religious ideals, the soul, and burial:

For religious people it will provoke most [sic] questions. These people used to be human like us … a living human being and they have a soul... That’s what they say. That would be a big subject to discuss... I have a friend, who is like a priest. We were in school together, and he could have been opposing this, guaranteed, even though he’s in favour of science, but he could have opposed these types of things. I know that 100%. Because he wanted to ask to [sic] them to bury the people. Give the proper burial. Doesn’t matter, these people wanted to be part of science...

Bob, a truck driver in his forties, spoke of the quotations on the wall and felt that God was left out of the exhibition:

Well, I didn’t notice, and this may seem odd for in this day and age, to say, there was a lot of quotes on the wall from all these people from all around the country,
or countries, but there was no quotes of anything to do with the Creator of the universe who made all this to start with. And I thought that was kind of odd. I guess odd that God was left out of the whole thing.

Conversely, a comment in visitor Book 8, spoke of the quotations in the exhibition and their dislike for alluding to religion:

...I was disappointed with religious interpretations of the heart mixed in with these important lessons. It marred the substance of the exhibit. There are so many interesting stories about the reality of human physiology and consciousness without pandering to dogmatic fallacies. The contrast between the scientific wonder and the contrived religiosity was the only down side. (Book 8, p. 227)

Interestingly, visitor responses explicitly referring to an intelligent design or evolution were only found in visitor books (150 comments). During interviews, visitors commented on potential of the exhibition to provoke questions related to religion and spirituality, however, no visitor explicitly argued or attempted to persuade the researcher that the exhibition was evidence for or against a God. Instead, visitors used the comment books to share these thoughts. Perhaps comment books provided a safer venue to talk about what are, for some people, sensitive and private matters.

Sanctity of life. A small number of visitors identified the exhibition to contribute to desensitizing the public to the sanctity of life. Here visitors questioned the exhibition in relation to their prior knowledge and experiences. Barbara, a health science student in her twenties, described her mixed reaction to the exhibition, struggling with whether the exhibition preserves the sanctity of life, comparing it to Nazi Germany:
I have mixed feelings about the exhibit as a whole… I just wonder just how much it can desensitize us... It can pique our curiosity.... because people like to see that kind of stuff.... so my question is, “would this have a desensitized sense of the sanctity of life, because life is not just a physical body, functioning. There is more to it than that. I mean we’re spiritual beings. We have emotions. And there’s a lot more to it than just our physical body. So when you narrow it down to just a physical body, then where can that lead your thinking to. You look at, for example, during Nazi Germany where they were using people for experimentation. That was really a sense of taking the body and saying, “well it’s just a body, nothing else matters, so we can do what we want.” That’s where I kind of question. You see people walking through casually and it’s just another “cool, wow, exhibit.” To me there could be danger in that, I would think.

Visitor comment books also identified the problem they had with the medium itself. “It’s terrible what they are doing to these poor innocent creatures. Humans are sick and cruel” (Book 10, p. 38). In reference to the display, a visitor commented: “Please stop defiling the dead!” (Book 10, p. 57).

*Occupation-related identity.* At the commencement of interviews visitors were asked to share their age and occupation. While this provided a small snapshot into visitors’ prior experiences with respect to work, visitor responses were reflective of and often included reference to their occupation, or what they “do.” Three dominant categories are identified: medical practitioners, artists, and students. Within these groups, broad characteristics emerged, which reveal in part, how visitor’s constructed meaning while viewing *Body Worlds.*
Medical practitioners connected their experience with *Body Worlds* to their work and used appropriate scientific terms when describing specific anatomy or disease. Oftentimes, connections were made between exhibits on display and work experiences. For example, Sally a nurse in her thirties shared, “I’m a cardiac nurse, so I felt connected to the parts on pacemakers, because… I could connect them in my head to different patients.” Many medical practitioners looked at the body with what appeared to be a clinically detached gaze: “I just blocked the spirituality out” (Radiyah, 30 – 39, Health care aide). Most medical practitioners indicated limited controversy or shock to be present in the display: “you know what you are getting yourself into” (Ben, 40 – 49, Paramedic). Bonnie, a critical care nurse in her thirties, interestingly described how she was able to view the display’s artistry because of the nature of her work:

I think because of where I work and my background in science, I don’t perceive this type of thing as science per se, because it’s such a part of my day to day life. So, for me, I think it is just more of an artistic exhibit as opposed to a scientific one… I think it enhances the appreciation of [the body] because you do see it from a different perspective, than just seeing the bodies laid out very clinically…

Students connected the exhibits to what they learned in school and viewed the experience as a way to reinforce their prior learning. Yiola, a health science student in her twenties, shared, “…for us to see things in textbooks, and in pictures and then to be able to relate it to actual people was very educational.” Natasha, a 20 – 29 year old Biochemistry student, reflected on how her views on use of cadavers and stem cell research changed in light of her chosen career path:
I think a few years ago… I was so against things like this and stem cell research, and things like that, but the more scientifically I get into school… I’m starting to realize a lot more, instead of being thrown into the trash, we could actually use them for displays like this so people know. So that we can learn as students…”

Students often times connected previously learned vocabulary to exhibits and appreciated being able to see what they learned in textbooks, in 3-D. In reference to her schooling, Celia, a psychology student in her twenties, said, “that’s really a huge reason why we are here, right?”

Finally, artists often speculated or debated the role of art in the exhibition, and if indeed, Body Worlds represented art. Angelo said, “he [von Hagens] tried to approach showing the human body through art, the artist’s way” (40 – 49, sculptor). William, a photographer in his thirties, shared, “I was able to appreciate the art and the vision Dr. von Hagens had and wanted to convey in his models, in his art. And I do call it art….

This is a new medium as an art form.” Oftentimes, artists speculated on the fascination with process of creation: “The shape is being preserved through plastination, but it’s like sculpture… [We have] fascination in the process and fascination in the thing itself, the body” (Bianca, 20 – 29, sales with art experience). Colleen, an artist in her sixties, contemplated the art and science in the display: “I understand the art that goes into preparing a museum exhibit, but I think the first layer is, shall we say, science, and then you realize that there’s a lot of art that goes into preparing museum exhibits.”

Often connections to art emerged, with artists spontaneously connecting the exhibitions to their experiences with art. Colleen a scientific illustrator said,
The main thing that has hit me is how out of practice I am drawing in those conditions. Because I haven’t drawn from life in 15, 20 years. I usually have to draw… botanical art. The challenges are very different. With this kind of art the proportions are absolutely critical. You have to get exact proportions.

Mark, an illustrator in his forties, speculated about the reasoning for the positioning of muscles on plastinates:

I think it was to have a very good understanding of the drapery involved in the muscle… I see it as for artists to come and actually sketch from it. To be able to appreciate it. To be able to get a point of view that they normally couldn’t get just in a life drawing studio.

Angelo, a sculptor in his forties, described his purpose for bringing his daughter to Body Worlds: “I was just showing [her] which model was good for sitting and studying and drawing… The was my purpose today… I explained [to] her how to draw. I’ll check it after.”

Themes emerging from visitor responses to the Body Worlds exhibition could be categorized into the personal, physical, or sociocultural contexts required for meaning-making as identified by Falk and Dierking’s (2000) Contextual Model of Learning. While participants in this study were not directly asked about contexts necessary to their meaning-making, their responses shed light on the influence of contexts to their meaning making. Next, I present a discussion for research question (a): Within the context of the Body Worlds exhibition what meaning do visitors make and how do they respond to the exhibits?
Discussion

In this section I use Falk and Dierking’s (2000) contexts necessary for meaning-making – Personal, Physical, Sociocultural, as an organizer for the discussion. Visitor responses to this exhibition through interviews, comment books, and observations were categorized into a number of themes (see Table 2). Much of the meaning made was found within the personal context, while the physical and sociocultural context seemed to support, facilitate and enrich those meanings. As Falk and Dierking (2000) note “as the individual moves through his sociocultural and physical world; over time, meaning is built up, layer upon layer” (p. 11). An analysis of the meaning made and visitor responses will be discussed below, with reference to appropriate literature to enhance the analysis.

**Personal context.** All three contexts of Falk and Dierking’s (2000) Contextual Model of Learning are necessary for meaning-making; however this study showed that specific meanings made relevant to the Body Worlds exhibition content were evident in the data themes that fell within the personal context. The physical and sociocultural contexts were seen to facilitate and enrich meaning made within the personal context.

Participants in this study shared illness narratives corroborating vom Lehn’s (2006) findings that individuals interacting with exhibits in Body Worlds engaged in discussion surrounding the body and illness. Interviewees made very personalized transpositions onto themselves, family or friends, or the general public which led to narratives (including autobiographical, family-related, school and work-related stories), validations and reinforcements (including behavioural decisions related to smoking, diet and exercise, and general health and stress), all of which are not mutually exclusive. Themes within the personal context accounted for the majority of visitor responses to this

The five identity-related motivations identified by Falk (2009) – explorers, facilitators, professional/hobbyist, experience seekers and spiritual pilgrims, aligned with visitor explanations for attending Body Worlds. Here, visitors classified as explorers were motivated by an interest in the content of Body Worlds, and facilitators wanted to create and support a learning experience for others. The facilitator category had a number of parents wanting to support learning opportunities for their children while a small number of visitors identified that their only motivation to attend was to keep their spouse or friend company. Those who demonstrated connections between exhibition content with their current work or schooling as motivation for attendance aligned with the professional/hobbyist identity. Experience seekers attended for a special occasion, and a limited number were seeking spiritual fulfillment, and hence categorized as spiritual pilgrims. What was relevant here was that visitors explicitly articulated their reason or purpose for attending the exhibition, supporting Falk’s (2009) notion that identity-related motivations explain visits to the museum, as well as are involved in meaning-making as will be illustrated in the discussion surrounding the sociocultural context.

It was apparent that along with motivations for attendance, visitors also brought expectations about the exhibition and the human body. Visitors knew what to expect of Body Worlds due to marketing strategies, having seen films about Body Worlds on television, or speaking with friends or family members who recommended the exhibition to them. Knowing what to expect in a museum, zoo, or aquarium, has been found to directly affect enjoyment and satisfaction of the experience (Falk & Amin, 1999) and
learning (Falk & Dierking, 2000). When asked to describe their expectations of the exhibition, visitors knew that full body cadavers would be present. While a limited number of visitors indicated that they did not expect the single organ exhibits, diseased organs, or the animals, visitors relayed that the exhibition met or exceeded their expectations and they had a positive experience, supporting the above assertions.

Visitors brought a range of prior knowledge, experiences and beliefs to the Body Worlds exhibition. This became evident during interviews as visitors connected the exhibition to the three realms of experience as identified by Silverman (1995), 1) special knowledge, 2) expectations and norms, and 3) life events and situations. Students and medical practitioners identified their knowledge of anatomy and the body by making connections with their schooling or work. Interviewees reflected on the controversial issues inherent in the exhibition and relayed their connections to societal norms and expectations. Many visitors described their acquaintance with the human body through experience with illness and health-related practices. Here, the universality of the human body meant that every visitor would have some form of prior knowledge, experience, or expectation related to the human body. Meaning made in this study was deeply rooted in visitors connecting and remembering prior knowledge and experience to present experiences (Silverman, 1995). These personal connections, in response to interacting within the museum context will be discussed below.

**Transposition.** What emerged from the data was the concept that visitors transpose plastinates onto themselves or others thereby allowing for the opportunity to make very personalized meaning. Transposition is defined to be a mental transference of the sensory experience of the exhibit onto oneself or others, paralleling vom Lehn’s
(2006) idea that: “visitors to Body Worlds make sense of the exhibits by seeing them in the light of their own bodies and those of others” (p.242-243). Being able to see an object and relate it to oneself showcased how the physical space became personalized for the viewer.

This process of making connections with objects on display and the viewer’s personal life allowed the visitor to see relevance in the exhibits in relation to their own life, and make meaning of it (Pedretti, 2012; vom Lehn, 2006). Interviewee experiences were multilayered suggesting that the process of transposition may be thought of as a spiral, as it continually occurs while the visitor is located within the physical space. Visitors transpose objects onto themselves or others as they move through the space which leads them to remember personal stories and experiences, leading to further transpositions, and hence further connections, ultimately resulting in complex connections being made with the exhibition. For example, interviewees in this study described how they could further understand disease they or others had in light of what they were observing (for example, transposing the plastinated heart onto a family member to understand which part was diseased). Recalling prior experiences, led to further transpositions (for example, taking their prior experience of disease and the heart, and transposing the exhibit showing stent insertion into the heart onto the same family) which contributed to deeper meaning-making. Visitors described specific organs or full body plastinates in relation to shared personalized connections with the specific objects. These transpositions build upon Cameron’s (1971) assertion as he describes the conversion of private museum collections, to democratic ones; “...it was being said that this was your [the visitor’s] collection and therefore it should be meaningful to you, the visitor” (p. 66,
emphasize in original). Visitors described parts of exhibitions that were meaningful for them, demonstrating the variety of interpretations and personalizations that exist among people viewing the same object. The co-occurrence of transpositions with stories, recalled behaviours, and identified issues suggests that transpositions and connections to realms of experiences are not mutually exclusive but may overlap and lead to deeper connections and enhanced perceived relevance in the display. Below, the prevalent connections that fall within the personal context central to visitor meaning-making are discussed: personal narratives, and validations and reinforcements.

**Personal narratives.** Personal narratives were central to interviewee responses with the *Body Worlds* exhibition. Through their observation of various diseases, visitors were reminded of their own narratives including autobiographical, family-related, and school and work-related stories. While gazing upon plastinates, interviewees connected past experiences and knowledge with the display before them. Stories were highly personal and at times emotional.

When considering autobiographical and family-related stories, visitors connected their *Body Worlds* experience to their prior experience with and knowledge of illness, injury, or lifestyle practices. Interviewees shared personal and family-related illness narratives which were not surprising given the context of this exhibition. What was surprising was the detail and emotion shared with the interviewers. These highly personal and emotional stories did not support the view that visitors observed the plastinates with a clinically detached gaze, as anatomy or medical students often view corpses (Walter, 2004a), but rather supported the importance of the personal lens (including illness
narratives, and personal knowledge of and experience with the body) (vom Lehn, 2006) that visitors used when making meaning of this exhibition.

Damasio (1994) writes about how emotion and cognition cannot be separated. He sees all learning, no matter how logical to involve emotion, and emotions to always involve cognition. Studies have demonstrated how memory formation is strongly associated with physical context and emotion; specifically under instances of positive affect (Aggleton, 1992; Calvin, 1997; Hilts, 1995; Rose, 1993). In this particular exhibition, even though some visitors described the exhibition as feeling like a funeral home, they relayed a plethora of emotions as they described their experiences. These emotions suggested that visitors connected with the content in the physical space as opposed to being strictly affected by the ambiance created. For example, many visitors relayed feelings of reverence for the human body as they contemplated the objects before them. Visitors described how they were moved by the beauty of the human body, and described how the exhibition had them contemplate their own mortality. Others described the difficulty and stress they experienced while attempting to quit smoking, while others expressed being thankful to doctors and the organs themselves that saved loved ones as they battled and conquered disease. At times intense expression of sadness emerged upon reflection of the loss of a loved one, while others shared their emotions related to the joy and challenge of weight loss. Visitors shared feelings of empathy and sympathy for the fetuses, and some expressed disappointment and at times feelings of personal inadequacy (related to their own bodies) when reflecting on sexuality and body image representation located within the display. Emotions were embedded within all responses, and were integral to the meaning made.
Validations and reinforcements. In addition to personal narratives, many interviewees shared how the exhibition validated or reinforced current health-related behaviours while others spoke of their intention to change current practices to become reflective of more healthy habits identified within the exhibition (i.e., quitting smoking, eating a more balanced diet, exercising more often). It should be noted that this study could only speak to visitor intent, as it did not interview visitors post-visit. These results supported the Institute for Plastination’s (2005) study which found visitors desired to change their health-related practices after viewing the Body Worlds exhibition. Viewing plastinates encouraged reflection upon current health-related practices, as visitors shared wanting to change their lifestyle habits.

Pedretti (2004) says that effective issues-based exhibitions should promote reflexivity for viewers, and Body Worlds accomplished this goal by showcasing an issue that had meaning for all its viewers – maintaining health. Many visitors had experienced health-related problems either personally, or with family and friends, and relayed these experiences through interviews. The recalled behavioural connections empowered visitors to reflect on how their own choices could lead to a healthier and longer life.

Central to this issues-based exhibition was the way in which it offered visitors the opportunity to make meaning of a relevant issue, while simultaneously empowering them to see how they could effect change through their personal practices. The Body Worlds exhibition offered information on how to maintain a healthy lifestyle (e.g., exercising, eating right, living stress-free) which, contrasted against human cadavers may have inspired visitors to change their lifestyle. Personalized connections in the form of recalled
lifestyle choices and understandings that were validated or reinforced allowed visitors to recognize that change was possible.

Falk and Dierking (2000) identify learning as “simultaneously a process and a product” (p. 9) and visitor descriptions of their meaning-making parallel this assertion. Visitors brought prior experiences and motivations to the exhibition and engaged in forging connections during and after the exhibition experience. This shed some light into the importance of time in meaning-making. Experiences that occurred after interaction or exposure to the exhibition, for example conversations with interviewers, may have contributed to further meaning being made. The meaning made or understanding gained may be considered a product of the interaction of the visitor with the physical space, mediated by dialogue with others.

Meaning made is not a time sensitive compartmentalized entity, but rather has the potential to be long lasting, and can be reinforced or contradicted by experiences that occur outside of the museum setting (Falk & Dierking, 2000). In this case, personal meaning made was evident in interviewee responses as they reflected on their visit immediately prior to leaving the exhibition. Interviewees described their transpositions onto themselves and others, and their personal narratives and validations and reinforcements. These personal connections demonstrated how the exhibition enhanced their understanding of health-related practices and the human body.

Physical context. As interviewees interacted with exhibits on display, they described specific physical features of the display that contributed to their meaning-making. Without these physical objects, meaning would not have been made. What was
evident through interviewee responses was that careful and thoughtful exhibition design enhanced and facilitated their meaning-making.

Three themes that emerged from the data and fell within Falk and Dierking’s (2000) physical context included: specific design features, the three dimensionality of the display, and the multisensory (visual, auditory, and kinaesthetic) experience. While visitors were not specifically asked to speculate on the physicality of the exhibition, comments surrounding exhibition design and its influence on their meaning-making emerged. In the case of Body Worlds, interviewees appreciated being eased into the exhibition through the gradual display of more elaborate plastinates. This finding supports the ethics review panel at the California Science Center’s suggestion to create displays that acclimatize patrons by beginning the exhibition with basic skeletons (which most people are comfortable with) and moving towards more elaborate and whole body plastinates (Moore & Brown, 2007). Viewing three-dimensional models enhanced the visitor experience as did the multisensory experiences of being able to see visual comparisons between healthy and diseased organs, listen to an auditory device that shed further information on the plastinates and organs, and being able to touch the organs available. Visitors acknowledged the medium itself as being effective and central to this exhibition. In all circumstances where interviewees alluded to physical design, they described how it enhanced their experience.

Visitors to this exhibition relayed key design features as they remembered their experience with Body Worlds. As visitors entered the exhibition they were confronted with the sound of a beating heart and a highlighted kneeling skeleton in a dark room. Visitors became quiet as they entered the exhibition; many described the physical space
to be reminiscent of a funeral parlour. Barker and Wright’s (1955) work on *behaviour settings* describes how physical settings reinforce particular behavioural rules that are culturally constructed. In this case, the presence of what were once human cadavers combined with dim lighting created the feeling of a funeral home, which in North America is often met by quiet contemplation. Visitors observed exhibits before them and whispered to their group members if they had something to share. A respectful and reverential atmosphere was created once inside the physical space.

Visitors identified and appreciated how the exhibition eased them slowly into seeing whole body plastinates. The exhibits progressed from simple skeletons and discrete organs to more elaborate displays which invited visitors to contemplate the complexity and ability of the human body. Visitors identified that the lack of blood and smell normally found in real corpses made plastinates accessible to the viewer, aligning with Kuppers’ (2007) findings of reasons for why plastinates are tolerated by the public. The variety of exhibits (variety of plastinate poses, individual organs, animals, text panels, quotations) supported sustained interest in the exhibition as indicated through observation, and played a role in visitor meaning-making as visitors described their connections with the exhibits.

When considering the subject of health-related practices, *Body Worlds* presented diseased and healthy organs side by side for visitors to compare and contrast. Organs were labelled to identify position within the body and where applicable, progression of disease. When visitors relayed their experiences through interviews, interestingly, very few referenced specific plastinate characters (for example, the ballerina, or hockey player) suggesting that while the poses may reduce viewer discomfort (Moore & Brown,
2007), they may not necessarily enhance meaning. Instead visitors regularly spoke of specific organs (e.g., the blackened lung, the enlarged heart, the knee) or of plastinates in general (e.g. the obese man, the fetal display). This may suggest that while plastinates were outfitted with an identity, visitors saw beyond these to connect with specific parts that were relevant to their own lives.

The three-dimensionality of the Body Worlds exhibition was integral to the visitor experience. Visitors described the value in being able to see two-dimensional pictures normally found in textbooks in three-dimensions and appreciated being able to walk around the whole body plastinates in order to view the body from different angles. This preference for three-dimensional objects supported the theory of experiential learning described to include a “direct encounter with the phenomena being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it” (Borzak 1981, p. 9). In addition the benefits of multisensory experiences used to engage learners in experiential learning of visual (e.g. quotations on walls, exhibits on display, multimedia), auditory (e.g., pre-recorded audio narration device, speaking with an expert) and tactile (e.g. manipulating organs) were also identified by a number of visitors to contribute to meaning made.

In this study, as interviewees described their experiences with Body Worlds, descriptions of the physical space that were integral to their meaning-making emerged. Visitors indicated that the physical context facilitated their meaning-making, specifically recalling design features, the three-dimensionality of the display, and multisensory experiences that enhanced their visit to Body Worlds.
**Sociocultural context.** Falk and Dierking (2000) suggest that the sociocultural context plays an important facilitative role in visitor meaning-making: “The sociocultural context...serves as a bridge between the individual’s sense of self, the personal context, and the nonself, or physical context, the individual must live within” (Falk & Dierking, 2000, p. 56). Falk and Dierking (2000) identify that within group and facilitated mediation are essential factors to impact learning. Central to these factors is dialogue between people: “Conversation is a primary mechanism of knowledge construction and distributed meaning-making” (p. 110).

Visitor interviews in this study lasted from 10 minutes to over an hour, demonstrating the desire of interviewees to share their connections with the exhibition. Interviews were often completed in small groups which enriched data by providing examples of lively discussion that occurred within the exhibition, as well as conversations and debates that arose after the visit. Some individual visitors said that they wanted to debrief and share with others, demonstrating the place for talk in extending meaning-making. Prior to the visit some visitors also said that they had spoken to others who had previously visited the exhibition. Here, expectations were created as interviewees heard of the *Body Worlds* experience through someone else’s perspective. When interviewees reflected upon talk related to the exhibition, it appeared that this dialogue served to extend and enrich the visitor experience, and perhaps deepen meaning made.

Examples of talk occurred between parents and their children, visitor groups, and between docents and visitors. Visitors conversed within their peer groups as they travelled through the exhibition, often asking each other questions, or a more experienced member of the group would share further information. Docents present throughout the
display would ask visitors (particularly children) questions or answer questions that visitors may have had. Their role was to extend or clarify information for visitors. Talk was often facilitative in nature with a more knowledgeable other scaffolding meaning-making through posing questions or offering further information. This interaction resembled social constructivism, where meaning-making is mediated through talk (Vygotsky, 1978). Other forms of talk included visitors sharing their personal stories, health-related behaviours, or opinions and beliefs with their peer group.

The findings in this study support Allen’s (2002) research, which attests to the importance of visitor talk and engagement with one another. Talk is particularly important for an issues-based exhibition where emotions run high, particularly as visitors are confronted with moral, ethical and at times religious questions. Allen’s (2002) work recognizes museums as places of dialogues, including implicit dialogues where exhibitions and objects hold stories. Encouraging conversations and reflections amongst visitors could foster more personal and emotional responses to emerge as connections, recollections, and experiences are drawn upon.

In addition to mediation through talk within groups and with docents, sociocultural contexts and influences including visitor’s beliefs, morals and identities emerged as they spoke about the display. References to religion and spirituality and sanctity of life emerged as visitors reflected upon their experiences with Body Worlds. Furthermore, responses could be loosely clustered or patterned in relation to visitor’s occupation-related identities – which represented yet another social group that formed part of their sense of self. Considering the sociocultural context “meanings are derived from the dynamic interplay between individuals and their social groups and are the result
of a process that involves the continuing reflection upon past and present experiences, evaluation, and judgment within a social and physical context” (Briseño-Garzon, 2013, p. 309). Data in this study supported the view that visitors’ interpretations and meanings made were influenced by their sociocultural understandings and experiences. Visitors’ conceptions of religion and spirituality were strengthened or brought into question by interactions with the display, and a few visitors contemplated the moral and ethical dimensions of the display in light of world events. Interviewees and comments in books indicated that the display had the potential to desensitize viewers to the sanctity of life. In their opinion, the display of the dead minimized the human condition as living, emotional, and spiritual beings.

This exhibition created a spiritual experience for some visitors. A number of visitors shared their ideas related to spirituality and religion in comment books. Interestingly, a variety of comments included reference to different Gods and ideas about the divine. Located within these comments were windows into visitors’ personal conceptions of religion that have likely been shaped by the culture they live within. Morgan (2007) describes how art is consumed by the religious visitor: “What people actually see is their representation of the divine. They see what their worldviews and needs predispose them to see… we all live within systems of representation, value, and beliefs which shape our experience of God” (p. 135). Visitors’ spiritual descriptions demonstrate the simultaneous individual interpretation of the visitor and the overarching collective view of the religious group the visitor belongs to, satisfying Briseño-Garzon’s (2013) idea that learning in the museum involves both social constructivism and sociocultural aspects: “learning is both a process of individual and social construction.
based on prior experience, and a process of enculturation by which learners develop a sense of identity that encompasses social norms, ideologies, language, and values” (p. 309). The spiritual views shared by visitors in this study, showcase both constructivism and sociocultural aspects involved in meaning-making.

Interestingly, the majority of comments surrounding spirituality, religion, and evolution existed within exit comment books. This could suggest that perhaps individuals’ views on the beginning of humankind is a private or controversial topic and is therefore easier to write about rather than talk about. However, one can consider the visitor books as a form of dialogue between visitors and the museum institution. Coffee (2013) writes about the importance of dialogue and visitor books:

The qualitative “data”—what visitors have to say—is the essential gift of the comment book: its place of importance in the museum experience as a further site of dialogue among visitors and between visitors and the museum organization. Visitor comments are comments to someone else; they are not an exercise in writing therapy…. Indeed, the authors of comments are aware that they are entering into a dialogue that is not completely revealed to them, but they are certain that they are entering into a dialogue. (p. 165-166)

Comments in visitor books may thus be seen as an extension of the exhibition visit as they offer visitors the opportunity to engage in a dialogue of sorts. In the case of Body Worlds, comment books offered the opportunity of visitor meaning-making around religion, spirituality, and evolution to be revealed. Visitor comment books may thus serve as important places for visitors to express themselves, especially around particularly contentious or private topics.
Goulding, Saren and Lindridge (2013) examined visitor responses to *Body Worlds* posted to public blogs on the internet. Interestingly, comments located within these blogs appeared to include responses more existential or philosophical in nature as visitors reflected upon their experiences. Goulding et al. (2013) identified responses to centre around broad themes of: *body as spectacle*, *body and mortality salience*, *commodified body*, *body as machine*, and *dehumanizing the body*. While Goulding et al.’s (2013) study offers insight into online dialogue that visitors may engage with, the data in this study suggests that observing and talking to visitors offers a more complete picture of personal meaning visitors make while in the museum.

Burns (2007) asserts that museum visitors may be categorized as either a *specialist* or *general public*. Both specialists and general public were identified in this study, and connected the exhibition to their prior knowledge, experiences, and identities. Specialists became highly evident as they shared their school and work-related stories, which often incorporated content and experiences directly related to their school or work. In this particular exhibition, interviewees with a background in anatomy and science, or work-related experience in the medical field (i.e. nurse, physiotherapist, veterinary, massage therapist etc.), related what they saw to content specifically from their anatomy and biology classes or workplace. These stories demonstrated the importance of relating and connecting prior knowledge, experience and identity to current experiences in order to make meaning (Burns, 2007; Falk, 2009; Falk & Dierking, 2000; Silverman, 1995).

Museum literature explores identity in three different ways: identity to predict visits to the museum and behaviour while there (Falk, 2006, 2009), identity discovery while in the museum (Paris & Mercer, 2002), and finally the potential of the museum to
create or sustain identity (Rounds, 2006). The occupation-related identities that emerged in this study supports both Rounds’ (2006) identify work and Falk’s (2006) identity-related motivations, especially the Professional/Hobbyist motivation. Rounds (2006) speculates that learners attend museums in order to engage in the process of identity work which can be defined as “the processes through which we construct, maintain, and adapt our sense of personal identity, and persuade other people to believe in that identity” (p.133). Central to this notion is the idea that visitors attend the museum in order to build, maintain or stabilize personal identity. Falk (2006, 2009) describes how an identity can motivate a visit to the museum; “This identity is specific to that visit, on that day, and although this identity will be consistent with how that individual “defines” himself or herself, it is unlikely that this identity is the one that would provoke the individual to say, "Now I see who I really am." (p. 154). Falk’s work (2006, 2009) suggests that identity-related motivations, namely “little ‘i’ identities,” drive a visit the museum.

The occupation-related connections that visitors made with the Body Worlds exhibition shed insight into how identity-related occupations might both motivate visitors to attend museum exhibitions (e.g., students wanted to deepen their understanding of school material) and provide a lens through which visitors make meaning, hence identity work: “Everyone is always in the process of doing maintenance work on existing identities while simultaneously laying the groundwork for future changes in identity” (Rounds, 2006, p.138). In this study, occupations emerged as “big ‘I’ identities” (Falk, 2009), which offered insight into particular group memberships that visitors identified with, providing a lens through which visitors made meaning.
Three major categories of occupations emerged in the data: medical practitioners, students, and artists, with broad characteristics representative of each group. Medical practitioners connected their experiences to their work and used appropriate scientific terms when describing specific anatomy or disease. Medical practitioners were far more clinical in their analyses and responses to Body Worlds, and referred to the educational value of the exhibition, and how it helped them to make-meaning, see, and understand. Medical practitioners rarely shared personal connections of family-related narratives, but instead spoke of the plastinates in relation to patients and of the science located within the exhibition. Here, it would appear that medical practitioners adopted a medico-scientific gaze as they observed the plastinates (Walter, 2004a). Medical practitioners highlighted the science located within the display and made personal connections with their work. Perhaps medical practitioners, due to their daily work, to some degree observed plastinates as they would patients.

Artists often speculated or debated on the amount of art located within the display, and commented on the ability of using the exhibits to practice their art. Here, both medical practitioners and artists seemed to be using “museum experiences to do identity maintenance… seek[ing] out structures that are consistent with… current narrative of identity, and so confirm and strengthen that identity” (Rounds, 2006, p. 144). Data in this study suggested that medical practitioners and artists were engaging in identity maintenance related to their work as they relayed and connected Body Worlds experiences with very specific experiences related to their work. Body Worlds held an artist’s sketch night, which occurred after hours and embodied a very different ambiance than was present in the traditional display. The majority of observed visitors were artists
who attended the exhibition to sketch. By understanding the identities and needs of visitors, *Body Worlds* curators were able to capitalize on and draw more visitors to its display.

In addition when considering motivations for attending the museum *Professional/Hobbyists* are motivated by content located within exhibitions as it closely resembles their work or personal hobby (Falk, 2009). Falk’s (2009) *Professional/Hobbyist* motivation may be applied as it was evident that medical practitioners were interested in seeking the science located within the display, while the artists wanted to attend the exhibition to practice their art.

Students also connected the exhibits to what they learned in school and viewed the experience as a way to reinforce their prior learning. Oftentimes, students spoke of hoping to enter into the medical profession. Here, the data suggested that students were using the museum as a way to engage in “identity exploration,” which leads visitors to “us[e] the museum experience as a way of building capacity for transformations that may or may not happen at some time in the future” (Rounds, 2006, p.144). Students also relayed wanting to attend *Body Worlds* in order to consolidate their learning in school. Here, Falk’s (2009) *Professional/Hobbyist* motivation may be applied to many of the students visiting *Body Worlds*. These students were often enrolled in degree programs somehow related to human health or physiology. Their desire to reinforce or add to their prior learnings in school motivated their visit to the museum.

Many interviews in this study occurred during the reading week break of the local university. Interestingly, the overwhelming majority of students who visited were enrolled in science-related school programs. Students discussed how the exhibits served
to strengthen content learned in school. Their interaction with plastinates appeared to be an important extension of their formal schooling as science students. Vagan (2011) writes about the significance of objects (be they conceptual dimensions, material objects, or social dimensions) in medical students’ development of professional identity formation. When students visit Body Worlds and interact with plastinates, the objects on display may be supporting students in their current or future identity formation. Future studies examining identity may shed insight into how objects within a museum can extend, reinforce or inform one’s personal or professional identity. What is apparent is that “a sociocultural perspective is needed to capture how the incorporation of artifacts provides people with tools of agency and identity; how artifacts mediate, expand, and limit action; and how they work as tools for individual’s identities in cultural worlds” (Vagan, 2011, p. 45).

While this study did not set out to explore the relationship between identity and meaning-making, it became apparent that identity does present a lens through which visitors make meaning, supporting Hooper-Greenhill’s (1999) assertion that responses are specific to individuals, as well as form patterns across audience segments. Future studies exploring identity and identity-related motivations may offer insight into how to create exhibitions that are relevant for a broad audience.

Falk and Dierking’s (2000) sociocultural context focuses mainly on factors of social experiences and dialogue. Further studies examining visitor responses to Body Worlds around the world could shed light on how specific cultural traditions, experiences, beliefs and values may influence meaning-making and visitor responses to an exhibition. Sociocultural theory identifies the importance of culture, environment and history in the
construction of meaning (Schauble, Leinhardt, & Martin, 1997), and it would be interesting to see how interpretations of *Body Worlds* and meaning made in response to the exhibits align or differ depending on cultural context and identities, and communities of learners. *Body Worlds* has been displayed in 45 cities around the world, and cross cultural studies could further reveal the complexity and richness that culture plays in meaning-making. As Falk and Dierking (2000) have noted: “humans are at once individuals and members of a larger group or society; learning is both an individual and group experience... What someone learns is inextricably bound to the cultural and historical context in which learning occurs” (p. 41). Future studies examining visitor responses through a cultural lens could serve to deepen our understanding of the visitor experience and meaning-making in museum settings.

**Summary**

To summate, research question (a) offered insight into specific personal meaning visitors made, and demonstrated the facilitative and enriching role of the physical and sociocultural contexts. The majority of visitors to this exhibition shared meanings related to the human body, with a specific understanding of health-related practices and understanding of disease. Through the process of transposition, visitors were able to forge connections between physical objects and their own experience. Shared meanings related to scientific content were connected to visitor prior experience of personal narratives (autobiographical, family, or work related stories) or recalled behaviours. Emotion was present, although to varying degrees. What was apparent was that visitor prior experience and possible identities offered a lens through which visitors viewed the exhibition and hence made meaning. This reinforces the notion that a ‘differentiated audience’ visits the
museum (Hooper-Greenhill, 1999, p. 5). Connecting past experiences and prior knowledge with a current experience leads to a plethora of meanings that visitors may make within an exhibition, all of which are very personalized.
Chapter Six
Tensions and Issues

In this chapter, the results and discussion for research question (b) will be presented: Within the context of the *Body Worlds* exhibition, what tensions and issues arise for visitors? This study attended to Oulton et al.’s (2004) conceptualization of controversial issues, and sought to explore what controversial issues visitors identified within the *Body Worlds* exhibition. Recall that controversial issues, according to Oulton et al. (2004), arise from differences in opinion stemming from religious, cultural, or moral beliefs, and are based on value judgments.

**Controversial Issues**

In this study 58% of interviewees questioned exhibition design, ethics, rules and regulations associated with *Body Worlds*. Visitors raised the issue of discomfort and/or criticism with the exhibition. Here visitors described their own issues with the exhibition, or speculated on the reason for public controversy. For example, Zenia, an office manager in her thirties, described the difficulty she experienced trying to get her family to attend the exhibition:

> Because of my job, none of it really affected me at all, but in trying to gather friends or family members to come and see the exhibit, I received a lot of mixed reactions from people just even contemplating coming. My sisters were debating, “should I go? Should I not? I’m worried it’s going to give me nightmares. I’m worried it’s going to upset me.” My mom [said], “that’s disgusting, why would anybody want to go see.” She just couldn’t fathom to go to a place to look at bodies.
Identified controversial issues with the *Body Worlds* exhibition are discussed in detail below and include fetal display and consent, plastinate detail, sexual representation, gender representation, body image representation, and the cost associated with the display. Keep in mind that the visitors who participated in this study ‘opted’ in—in other words any discomfort they may have felt about the idea of plastination did not preclude them from attending *Body Worlds*. Those who felt strongly about the use of plastinates for display as wrong or unethical probably chose not to attend. However, visitors could certainly identify controversial issues for themselves or others.

**Fetal display and consent.** In response to the medium itself Jordyn, a corporate executive in her forties, identified the fetal section to be a potential area of controversy for the public: “Well, probably the fetuses. They didn’t disturb me in any way, but I could see that others might be disturbed by them or find them unsettling.” Stacy similarly identified the potential for mothers to dislike the fetal section: “Some moms might not like that one, especially if they’ve gone through something like that. I mean, I could see them being sensitive about it” (20 -29 year old, records clerk). The issue of consent arose for the fetal display, with Ewa and Jake engaging in dialogue:

Ewa: [Controversy] Maybe based on consent. The babies can’t give consent.

Jake: But the babies have already died. It’s not like they took these babies out of the mom for the purpose of plasticization (sic).

Ewa: Yeah, but I don’t know. But then you get into that whole debate on when does something become a living being, when does it have rights? You know how people are. They go nuts.

Jake: But the baby died. In every single case …
Ewa: Yeah, but if a person had died, they wouldn’t have been allowed to use it unless the person had consented to it.

Jake: Oh, I see what you mean.

Ewa: So, it’s all about that line … when does the embryo … if the heart starts beating are they a person, do they have rights. Where does all that fit in? People are nuts about it, but that’s where I would see the big problem, but I don’t have a problem with it.

Jake also spoke of the exhibition and the issue of abortion compared with religion:

[When] teenagers… were in the exhibit, they looked at the baby at 27 weeks, it was almost fully developed. And they said, “wow, a week before that, you are legally allowed to abort the baby.” And then they said, “that’s really weird. That looks like a baby.” So when one of the girls commented, “I wouldn’t have an abortion past a month or two because they’re that far in…” by seeing the baby they intuitively felt that it was wrong to have an abortion that late… So all the Christians, or whoever, that are complaining about having the babies on display it could be supporting their cause anyway.

Juanita, a lunch room supervisor in her fifties, also spoke of the issue of abortion and how the fetal exhibition may provoke one to consider this issue: “the abortion issue … you think about that when you go through the baby exhibit.”

Hamas, a medical student in his twenties, spoke of his friends’ discomfort surrounding fetal consent: “my friends were really uncomfortable with the babies. They thought that was unethical because a baby can’t give a consent, and who are you, the mom, to give a consent. But the baby can’t.” Visitor comment books also echoed these
sentiments: “Babies can’t sign; How did you get consent for embryos/foetuses to be plastinated?” (Book 6, p. 73). Also, along the lines of consent, some visitors remarked about consent from animals in addition to the fetuses:

I hope that one day very soon the animal exhibits will be removed as it is unethical to show them as they have not consented nor can they, as the humans have. Very contradictory to emphasis the legal consent given by humans when no information has been provided for how the animals or human embryos were acquired. (Book 7, p. 9)

**Plastinate detail.** A minority of interviewees commented on the difficulty they experienced when viewing fingernails and toes, elements of plastinates that seemed to make them more real. Parminder, a communications worker in her forties, explained, “something about... the parts that we see more day to day, seeing the toes curled up and the eyes... I don’t know why the nails bother me. I must have a thing with nails, and eyelashes and eyeballs... I won’t look too close at those.” Maria, a veterinary masseuse in her forties, similarly shared, “What was odd is it takes a lot to gross me out, toenails bothered me. I’m not sure why.” A few of those interviewed also questioned the positions of the plastinates, with Lana, a photographer in her thirties, recalling a past gestalt described as a “man with drawers:”

I didn’t like the person made in the drawers or the people sliced into layers... it looked too real I guess like people rather than a piece of meat. You know that these are human beings and that someone actually had to take a piece of equipment and tools and slice this person. Someone had to actually do that. So you just think about those things like how the exhibit was created and you wonder
where did this vision come from? How did someone think about making the person into drawers? I think, like what kind of mind does this person have that would make this into, like is it on the border of being an artist, or is it on the border of it being a little sick? Cause if this was done while the person was alive then it would be called murder, but because they’re dead is it okay?.. if they were alive and could see themselves that this is what was going to be, would they be happy with that?

Here the gestalt plastinates were called into question in a very powerful way. Words and phrases like murder, sick, disgusting, disturbed, slice of a person, clearly reflect some visitors’ distaste with plastinates displayed in ways not representative of the true human form.

In addition to gestalt plastinates pushing the boundaries, Body Worlds also has an exhibit of a copulating couple (Jess, 2009). This exhibit however has not been displayed in Canada suggesting that science centres find this particular display to be too controversial to present to the public.

**Sexual representation.** Visitor comment books included remarks (174 comments) about the sexual nature of the display, deemed to be useful. One of the most predominant comments in visitor books were sexual expletives, marked as not useful in the overall book tallies. When writing about the sexualized nature of the display one visitor described it as “erotic” (Book 7, p. 43). Another writes: “You should have a demonstration of two people having intercourse. I’m sure people would like to see how the body works in that way” (Book 2, p. 99). Visitors commented on the overt display of genitals, and at times sexuality. Throughout all visitor books, images of male genitalia
and reference to human genitalia could be found, for example: “I felt there was more emphasis on the male genitalia and would be interested in seeing more of the female” (Book 1, p. 48). Some visitors noted the unequal representation of reproductive organs and sexuality: “Please, there needs to be more display and education on female orgasm and conception (maybe also ovulation)” (Book 7, p. 76). Wanting to see the complete female reproductive system, one visitor shared, “Why don’t they show a female clitoris, labia, and vagina all connected together? Yet we see an entire penis with testes? Are we still so afraid of female sexuality in 2010?” (Book 8, p. 380). Visitors also commented on the bear’s genitals: “I saw a bear with his penis hanging out... with hair on it... it was traumatizing” (Book 8, p. 419).

During interviews, visitors spoke of the potential discomfort posed by the display of genitalia. Kennedy, a provincial government employee in her thirties, said, “I could see a group of young school children snickering at all the genitals. I could see that. And I think that some people might find nudity or nakedness displayed that way… uncomfortable.” Ford, a graphic designer in his fifties, shared, “I do know that if I was dragging mom through it... there would be a lot of questionable aspects about why the level of sexually is displayed.” Jill, a mother in her twenties, commented, “Some people might take offense to the fact that the sexual organs are completely visible.” Sufiya, a forensics student in her twenties, also spoke of the sexual organs on display: “It’s so taboo, you’re not supposed to know that stuff until you’re married... so that could make people very uncomfortable when they are going through...” Pat, an accounting clerk in her thirties, spoke of how the public could potentially take offense when viewing the genitals, but herself did not have a problem with them:
Well, they had the genitalia open and available and I suppose if someone wanted to take offence at that, they would find a reason to take offence. Personally, it didn’t bother me. It’s part of the anatomy and people should really get over themselves in their attitudes.

Many comments in visitor books used the word ‘perverted’ when commenting on the display. Contrary to the visitor books, one visitor interviewed said, “There was nothing pornographic or anything that you could say that might strike into controversy” (Kasia, 20 – 29 year old, forensics student). Interestingly, this comment comes from a forensic science student, so perhaps she is used to a level of explicit detail.

Gender representation. The issue of gender representation was another theme in both visitor books (127 comments) and interviews. Visitors took notice of the predominantly male displays: “I noticed many males in there;” “Need more women” (Book 1, p. 25, 29); “Too many penises” (Book 10, p.54); “Kinda sexist mostly males” (Book 2, p. 55); “Please more specimens of female reproductive organs dissected” (Book 8, p. 169). Commenting on the number of female plastinates, Margaret, a bookkeeper in her forties, said, “My sister commented on when I said ‘oh, here’s a female.’ Because the first few exhibits were male, and I said, ‘oh, look, finally a female.’”

A topic frequently commented upon in visitor books was that of the unequal display of male and female sexual organs and sexuality. “I feel it is very important that the female plus male reproductive systems are equally represented. Where are all the ovaries?!...” (Book 7, p. 76). Commenting on the display itself a visitor in Book 8 identified an underlying commentary: “Why was the uterus unlit and about cancer whereas the penis exhibit was about sperm and virility (and right beside the giant bear)!”
Not too subtle” (p. 102). Many comments in visitor books remarked upon the nipples present on female plastinates, but not on male ones: “One question: how come the women have nipples but the men don’t?” (Book 10, p. 161). And to summate:

I was troubled by the masculinist nature of the exhibit and the consequential miseducation of certain: namely heart attacks (which appear differently in women). Further it seemed odd and slightly confusing that only the female bodies (and all of them at that) had nipples. There was a general imbalance between male and female bodies and a lack of female genitalia (sic). (Book 8, p. 121)

Visitors questioned the difference between the positions of male and female plastinates: “…you seem to have pointed the toes of every female body. Why?.. Woman (sic) are not endowed with any more tendency toward the awkward position…” (Book 7, p. 11). In addition to female poses, the question of audience and characterization emerged: “Lots of female bodies; all of them unable to stand as erect as the males. What are these women posing for? Why do they get wigs, and nipples, but the men don’t??” (Book 3, p. 164). Similarly, a visitor comment in Book 8 identified the positioning of the female plastinates to be discriminating:

It is a great scientific exploration of the body. I do however feel that the women in this exhibition were displayed in sexual and discriminating positions. One in particular where she is laying down and holding herself up by her hands on her hips letting her legs and buttocks in the air. Obviously revealing the anus and vagina. (p. 264)
Visitors expressed interest in seeing additional displays: “Would have liked to see a female bodybuilder or stronger female pose;” (Book 8, p. 94) and “Display a post op transsexual” (Book 1, p. 67).

**Body image and representation.** Some visitors shared insights into their own body image through the comment books. Also included in this theme are visitor interpretations of human representation in the exhibition. While this had the fewest number of comments in the visitor books (32 comments), insightful questions and comments arose about body image, which is unique in a setting like a science centre.

This exhibition had complete cadavers plastinated as well as a body slice of an obese man. When commenting on the obese man, visitors expressed interest in seeing a variety of body shapes: “It would be interesting to see a comparison to an obese person alongside an anorexic person. As well as a body builder” (Book 5, p. 7). Some visitors felt self-conscious when reflecting on the plastinates before them: “I was put to shame, get more average guys in there” (Book 1, p. 25); “The hockey player... has a big penis! I wish mine was that big” (Book 9, p. 171); “My [girlfriend] thinks she needs to be skinnier” (Book 8, p. 47).

Visitors questioned the lack of diversity located within the exhibition, speaking about body type: “I saw lots of lean bodies but not different types of bodies!” (Book 6, p. 6), hair and eye color; “I wondered why all the humans were all blonde and blue eyed” (Book 8, p. 221), as well as skin color; “Where are the black [people]?” (Book 3, p. 304). Alternatively, some visitors expressed that the exhibits demonstrated the similarities between all people: “This exhibit seems like an amazing way to generate wonder about the complexity of physiology while dispelling mysteries and taboos about the workings
of the body and superficial differences between the ‘races...’” (Book 6, p. 3). Similarly, Margaret, a bookkeeper in her forties, said,

I said to my sister when we were walking through and we were looking at what’s inside of each and every one of us that is walking around looking at the exhibit, that we all carry this. It’s a part of ourselves that isn’t visible to us. So, yeah, something that we have in common with all people, so it was really interesting in that respect.

William, a photographer in his thirties, also spoke of the universality he believed to be represented in the exhibits:

...if he [von Hagens] is trying to educate the public it would be just by realizing and understanding that we are just humans and under that skin it’s just meat and we all look the same. It’s just education - what’s underneath. We all function the same.

Finally, under this theme, the topic of representation emerged with visitors commenting on the macabre nature of the display. Mark, a children’s illustrator in his forties, noticed the gestalt plastinates commenting, “That one right close to the front. That one drew a little bit more of a macabre feeling.” Likewise George, a textile manufacturer in his forties, shared, “They [family] didn’t want to come in, especially my mom because of the macabre, that kind of issue here.” A comment in Book 7 read, “Ghoulish yet delightfully macabre” (p.7). Another visitor expressed their dislike for the display, “I think it’s sad the way people exploit themselves after they are dead. I think people should only give their bodies to find cures for diseases not for curiosity” (Book 4, p. 4). Lana, a photographer in her thirties, compared the exhibition to *dime museum* exhibitions: “I
think that people go for a freak show. Because back in the day in those circuses there used to always be... the weird individuals... So people go to see something different.”

**Cost.** Visitors identified the high cost of the exhibition and questioned the motives for these high fees as well as the accessibility barriers they posed. William, a photographer in his thirties, commented, “It really disturbs me that I know that these exhibits are not just for public retention and public experience, but it is for profit.” Likewise, Ellie a nurse in her fifties expressed the inaccessibility the high price of admission poses: “If you are a family who doesn’t have a lot of disposable income, then you don’t have access to this, to all these things, it’s costly... I think that’s a shame.” Comment books also included reference to the cost of the exhibit, describing how information should be accessible: “Fantastic exhibition but that should not be too expensive so everyone can enjoy and get the knowledge” (Book 3, p. 92).

In addition to the responses that were presented in Chapter 5, where visitors shared their personal connections with the exhibition, thoughts on the physical space, and sociocultural aspects emerged, Chapter 6 demonstrates the thought provoking and controversial nature of the *Body Worlds* exhibition. Many visitors speculated on and contemplated the ethical, moral, cultural, or religious issues that arose for them during their visit with this exhibit, showing the complexity of responses while viewing *Body Worlds*. In the following chapter visitor responses related to the nature and purpose of science centres are explained.
Discussion

In this section I present the discussion for research question (b): Within the context of the *Body Worlds* exhibition, what tensions and issues arise for visitors? The use of human cadavers elicited views about the social, ethical, and moral dimensions associated with presenting the dead. In this particular case, *Body Worlds* embedded science education in the display of human corpses - a medium that is inherently controversial (Pedretti, 2012). Sociocultural theory identifies the importance of culture, environment and history in the construction of meaning (Schäuble, Leinhardt, & Martin, 1997) and the reflections of issues and tensions that visitors shared offered insight into how visitors’ cultural beliefs and values may influence interpretation of issues: “Issues are not controversial by nature, but are socially constructed in ways that cause them to be more or less controversial” (Hess & Avery, 2008, p. 510).

Politics and subjectivity entered this exhibition through the quotations on the wall, reference to famous athletes, compartmentalized area for fetal display, body donation propaganda, and the medium itself. Interestingly, visitors noticed these, and openly discussed and debated their views during the interviews. Visitors’ opinions and beliefs were often value laden and demonstrated differences in religious, cultural, or moral beliefs supporting Oulton et al.’s (2004) conceptualization of controversial issues. Identified tensions with the *Body Worlds* exhibits demonstrate the variability that exists among people with respect to what they can tolerate and what they have issue with. The purpose of research question (b) was to determine whether people who chose to attend the *Body Worlds* exhibition found issues or could identify possible issues for others within the exhibition.
When interviewees were asked to describe tensions or issues they personally had, or could see others having, a number of issues arose including: use of human cadavers for display, sexuality and gender representation, body image representation, and cost of visiting the display. Visitor responses were emotionally and politically charged, similar to research on other issues-based exhibitions (Pedretti, 2004), and also produced critical questions related to politics and power.

Visitors grappled with the ethical dimensions surrounding the use of human cadavers for display. The issue of fetal consent and their use arose, as visitors wrestled with the appropriateness of the fetal display. Interviewees expressed distaste with plastinate detail and positioning, identifying the loss of dignity in corpses as they were placed in gestalt poses (e.g., man with drawers).

The level of sexuality involved in the display was problematic for some. Visitors questioned the display itself wondering why males dominated displays, and why females were displayed in highly sexualized and submissive poses. Interestingly, the copulating couple exhibit has not been brought to Canada demonstrating that curators deem this to be a highly controversial exhibit. Also troubling for visitors was the unequal and, in their view, sexist representation of gender in this display specifically related to women, as well as the lack of transgender display. Visitors questioned why complete female reproductive organs were lacking from display, and the positions of the female bodies. Male plastinates were often outfitted with athletic equipment, while female plastinates were dressed sparsely as ballerinas, yoga instructors or figure skaters. This led interviewees to question the display to perpetuate the ‘ideal’ or stereotypic roles of men and women.

Some interviewees reflected on the representation of body image in the display,
identifying that all plastinates were lean and muscular. Comments from interviewees and visitor books questioned why all plastinates had blonde hair and blue eyes, and some wondered why other ethnicities were not displayed. The above identified issues of sexuality, gender, and body image representation overlap, and demonstrate the general public’s perception of how this exhibition serves to perpetuate stereotypic norms.

Another controversial issue identified by visitors to *Body Worlds* was the cost of the display. Motivation for the high price of admission and resulting accessibility was questioned. Visitors shared views that cost could limit access for some members of the population who would be interested in visiting this science exhibition.

Issues that visitors raised brought to light the political nature of creating displays (Cameron, 1971; Leupken, 2011; Macdonald, 1998). Exhibitions are often displayed void of the decision making process that leads to what is presented, how it is presented, and who decides what is presented. Oftentimes, perceived implicit messages beyond the stated exhibition goals are interpreted or perceived by the viewer. Visitor responses to the *Body Worlds & The Story of the Heart* exhibition identified subtle underlying messages of power that serve to reinforce societal norms.

Foucault (2003) defines power to be present in relations throughout an entire social body. He sees power relations as integral to any society: “A society without power relations can only be an abstraction” (2003, p. 140), however, this does not imply that all power relations are necessary and good. Instead he argues “...that the analysis, elaboration, and bringing into question of power relations... is a permanent political task inherent in all social existence...” (p. 140). In the case of *Body Worlds*, the immediate relationship of power lies between the visitors and the exhibits on display, and in turn
between von Hagens’ (who created the exhibits) and the visitor. The data in this study suggests that the *Body Worlds* exhibition be classified as a heterotopia (Foucault, 1967) – a place that mirrors western cultural norms, which contrast stated cultural values. The characteristics and features of plastinates display cultural norms of the ‘ideal’ stereotypic representation of gender roles, body type, and appearance. Many of these underlying messages in the exhibition contrast with alternative cultural values, possibly contributing to visitors’ experienced dissonance and discord with the display. Through discussion of issues and subsequently power located within the display, the sociocultural perspectives of viewers became apparent. Visitors’ shared beliefs shed light into culturally constructed ideals, values, traditions, and views of the world: “The sociocultural context defines both who we perceive ourselves to be and how we perceive the world we inhabit… The world has meaning for us because of the shared experiences, beliefs, customs, and values of the groups that inhabit it with us” (Falk & Dierking, 2000, p. 39). Visitors’ shared tensions and issues demonstrated that when an exhibition was at odds with one’s own sociocultural beliefs, the exhibition was called into question.

Von Hagens’ creations are on display for the visitors to observe at the science centre, a place that is often viewed as authoritative, objective, reliable, and powerful; void of social, cultural, or political implications (Hodson, 1998; Macdonald, 1998; Pedretti, 2012). This becomes problematic, as the *Body Worlds* exhibition is automatically afforded the power inherent to the science centre. Some visitors to this particular exhibition, however, questioned the decisions involved in the production and product of this exhibition. The data demonstrated that when a scientific display was at odds with a visitor’s sociocultural perspectives, a critical approach to appraising the exhibition was
used. Visitors posed questions and engaged in dialogue and debate with their group members surrounding controversial issues. Often times consensus was not reached, for example ethics behind fetal and animal consent. However visitors did present, acknowledge, and reflect on multiple sides of the issue.

The *Body Worlds* exhibition encouraged dialogue and debate among its visitors due to the controversial nature of the display. Interviewees shared opinions around particular issues, and simultaneously acknowledged other points of view around the same issue. Miller (1998) describes civic scientific literacy as requiring individuals to demonstrate awareness of multiple sides of an issue, and to be able to assess these points. The data in this study suggest that the *Body Worlds* exhibition broadly contributed to the development of civic scientific literacy (enhanced awareness of scientific issues allows decisions to be made in a democratic manner), practical scientific literacy (use of scientific knowledge to solve practical problems), and cultural scientific literacy (people are motivated to know about human achievement in science) (Shen, 1975). Civic scientific literacy seemed to be enhanced as interviewees demonstrated mindfulness surrounding multiple sides of some issues raised by the display. Miller (1998) writes:

> Since it is primarily at the point of controversy that the public becomes involved in the resolution of scientific and technological disputes, it is clear that meaningful citizen participation requires a level of civic scientific literacy sufficient to understand the essential points of competing arguments and to evaluate or assess these arguments. (p. 204)

The *Body Worlds* exhibition offered visitors an opportunity to think critically about a scientific display laden with controversial issues. Interviewee group dialogue revealed
debate among peer groups as they attempted to come to some sort of consensus as they wrestled with their own ethical and moral standards, and the display before them presented in a science centre. It would seem that a controversial scientific exhibition, at odds with one’s ethical, moral, or religious beliefs, has the ability to promote a critical approach to appraising the exhibition thereby contributing to the development of civic scientific literacy.

Data in this study suggests that issues and tensions emerged primarily within the sociocultural context (Falk & Dierking, 2000) and contributed to meaning-making of a controversial issues-based exhibition. The nature of this exhibition appeared to promote reflexivity as Pedretti (2004) found with critical issues-based exhibitions. Controversial issues-based exhibitions confront visitors with content, images, and information that may contradict their religious, cultural, or moral beliefs leading to critical reflection as visitors contemplate the authority of science in relation to their own views. Macdonald (1998) argues that “museum exhibitions are agencies for defining scientific knowledge for the public, and for harnessing science and technology to tell culturally authoritative stories about race, nation, progress and modernity” (p. 19). As such, it behooves exhibition curators to be more transparent in their decisions that lead to a final display product, especially in a science museum where science is viewed to hold absolute truths. Not doing so, as Cameron (1971) suggests, may lead to misrepresentation of the nature of science, culture, and even objects on display and these displays may for example, encourage negative views of other cultures, or may serve to reinforce stereotypes. Museum curators are encouraged to reflect on their own designs and ask: Who is empowered or disempowered by certain displays? How does the content and style of an
exhibition inform public understanding? What unintended messages do visitors take away? In doing so, the politics behind display will become more transparent allowing visitors to form more informed opinions and beliefs of the exhibition before them.

This study supports the importance of talk between the public and museum curators particularly around exhibitions that might generate tensions for visitors. Anderson (2004) identifies “the growing role of the public… [in] conversation about the future of the museum and the shaping of exhibitions, programs, collections, and other activities” (p. 5). She writes about how museum leaders should identify visitor needs and interests in order to make decisions that respond to their needs “while simultaneously challenging them with new ideas and interpretations” (Anderson, 2004, p. 5). Issues recognized by visitors within the Body Worlds display support Cooks’ (1999) suggestion to preview controversial exhibitions so that biases and/or sensitivities may be exposed. Visitors to the Body Worlds exhibition spoke with interviewers and left comments in books articulating their identified issues presented in the display. Visitors were willing to share their thoughts and ideas related to exhibition design and curators may be able to enhance exhibitions by engaging in dialogue with the same consumers of their exhibitions. When dialogue occurs between curators and the public, “a product that is more effective as a result of shared responsibility, joint planning, and exhibition development” may occur (Anderson, 2004, p. 6).

Summary

This study suggests that exhibitions are never just “representations of uncontestable facts” (Macdonald, 1998, p. 1) but rather hold powerful messages that are often controversial, complex, and difficult for visitors. Visitor responses to the Body
Worlds & The Story of the Heart exhibition identified subtle underlying messages of power that serve to reinforce societal norms, suggesting this exhibition may be classified as a heterotopia (Foucault, 1967) – a space that mirrors western cultural norms which contrast the visitors’ cultural values. Since the science centre is deemed and identified to be a place of credibility (Hodson, 1998) museum curators are reminded to be objective and transparent in the process of design and production (Bennett, 1995; Cameron, 1971; Leupken, 2011; Macdonald, 1998; Starn, 2005). Cameron (1971) suggests that exhibitions should be designed with their original context in mind, yet should relate to contemporary society and experiences of the visitor. “The public has a right to expect that the collections presented and interpreted [should] in some way be consistent with the values of its society...” (p. 66). The subtle underlying messages in the Body Worlds exhibition demonstrates the usefulness in piloting exhibitions in order to obtain feedback surrounding potential biases that may exist within the exhibition (Cooks, 1999). The agendas and beliefs systems of curators must be examined critically by museum staff and the public to ensure that messages of power that contrast societal values are not perpetuated.
Chapter 7
Changing Role of Science Centres

This chapter presents findings and discussion for research question (c): Within the context of the *Body Worlds* exhibition what does this type of exhibition convey about the changing role of science centres and the nature of their exhibitions? This chapter begins with presentation of analysis for this question and is followed by the discussion and interpretation.

**Purposes of the Science Centre**

In asking visitors if they felt that a science centre was an appropriate venue for *Body Worlds*, some insight was gained into what visitors perceive to be the function and purpose of a science centre. Visitor views of the science centre as a venue for *Body Worlds* are presented here, as well as their ideas on how the exhibition could be enhanced. Several themes emerged from the data that point to the various ways in which the *Body Worlds* visitors viewed the role of the science centre. These themes are presented below.

**Science centre as a place of science.** Visitors to the science centre identified it as a place to house exhibits predominantly scientific in nature. This was a very prevalent theme. Visitors contrasted the science centre with the Royal Ontario Museum (ROM) and the Art Gallery of Ontario (AGO). The general consensus was that the AGO was a place to observe art: “At the Art Gallery, people just sort of take a look and walk on, take a look and walk on...” (Stacey, 20 – 29 year old, records centre specialist). Catherine, a manager in her sixties, described how the art gallery would detract from the *Body Worlds* exhibition purpose saying, “... the people who would go to the Art Gallery would look at it more of an ‘arty’ thing, because it is sort of an arty thing, but really it’s more about the
body. The art gallery? I don’t think that would work.” Visitors did not identify the ROM or AGO to be a place of science. Rather, the display of science related materials, in their view, occurred at the science centre:

I think it would fit into the ROM, but I don’t think it would have the same impact there because I don’t think people are aware for the same reason. When you come here, you’re sort of primed for scientific stuff. I think if you go to the ROM, you’re not really in that mindset.... (Nick, 20 – 29 year old, strategist)

When asked to comment on whether Body Worlds belonged at the science centre, visitors identified the scientific nature of the display as reason for the appropriateness of the venue. Of all participants interviewed, 82% of visitors believed Body Worlds belonged at the science centre, supporting this notion with their identification of the display as scientific: “It’s 100 percent science,” said Bob, a truck driver in his forties, while Molly, a TTC driver in her forties, said, “It is science. It’s your body.” “It deals with the science of the anatomy,” said Ben, a firefighter in his forties. Anna, a student under twenty, said, “I just associate it with science. Like how our body works is science.”

When asked if the exhibition belonged at the science centre, Jim, a retiree in his fifties, proclaimed, “Oh definitely. How much farther into science can you go than into the human body because, I mean, that’s what we’re about.” Amanda, a health science student in her twenties, agreed, comparing the exhibition to other exhibitions in the science centre: “to me … I think there is a lot less science in some of the other... science-y things... if this doesn’t belong at the Science Centre I don’t know where it belongs!”

When asked whether she could see the exhibition at the ROM or AGO, she identified, “No... you can appreciate it from a science perspective...and it’s not just pure
entertainment.” Christine, a project coordinator in her forties, also agreed the exhibition belonged at the science centre stating that:

This is the type of thing they should have at the Science Centre. 100 percent, because it’s exploratory, it’s relevant; I think it’s something that people can relate to themselves directly. It’s neat to go see a science thing, or space thing...but when you can sit and say ‘wow, I can see that’...I thought that was really, really great...

Celine, a secretary in her forties described how the other exhibitions in the science centre complemented Body Worlds, “the Science Centre offers… things like testing a lung, or blowing into a machine, seeing your reaction to things and how your body reacts. They have that on different floors in here, so it kind of ties it all together.” Angelo, a sculptor in his forties, thought it should become a permanent display saying, “Sure... Full time, because people want to learn.”

**Science centre as a place for learning.** The majority of visitors conceptualized the science centre as a place for learning. Visitors described the scientific nature of the display and the inherent educational potential. They identified the educational role of the science centre for adults, children, students, and families, and spoke about the educational value of the exhibits by presenting scientific information for learning purposes: “I think that it is a great learning and teaching opportunity and I think that is what the science centre is about” (Marianne, 40-49 year old, financial planner); “It’s very educational here like the rest of the science centre.... it’s what this place is all about... It’s about learning” (Florence, 30 – 39 year old, massage therapist). Participants similarly viewed the ROM as a place to learn, however about different content compared with the science centre. Sally,
a nurse in her twenties, said, “I think I go to the ROM to learn about different cultures and learn about dinosaurs… I find going to the ROM very informative and educational. Just like here [the science centre].”

Interviewees noted the large number of school groups that visited the exhibition on fieldtrips in order to complement their school programming. Bianca spoke of how she believed students could take more away from the exhibits by altering their assignments while in *Body Worlds*:

> It’s kind of unfortunate, because I think it could be a really powerful exhibit for kids if it were done properly. But they just had a sheet of paper and they had to walk around and write down the titles on the top. And I think it’s something, especially for kids, that you almost need someone to take you around and explain it, as opposed to read this poster. Read this other one. Read this other one. I feel if it were more interactive, then they would take more from it. (20 – 29 year old, sales rep)

In addition to secondary school groups, a number of university students attended and spoke of their desire to learn from the exhibition in hopes it would help them with their studies: “We’re all pre-med students, so… anything that helps us along the way...” said Sophie, a student in her twenties. Similarly, Sufiya, also a student in her twenties, described how her boyfriend, who was not in a science program, tried to rush her and her friend through the exhibit but they took their time: “We find this stuff interesting, it’s what we do. So we like to take our time and learn even more about it.”

Marianne, a financial planner in her forties, also described the science centre as a place for learning where parents could educate their children:
I heard a lot of parents even with the younger kids putting it into better terms. Like, their terms... they’re teaching about how the body works, and younger kids ask different questions, and so on different levels, it doesn’t have to be way up here on university level, you know, “well what’s that, it looks like bandaids” I think the one little girl was saying and the mom was like “well those are our tendons.” So, I just think that it is a great learning and teaching opportunity and I think that is what the science centre is about.

Ewa, a student in her twenties, reflected on the venue and also expressed her identification of the science centre as a place of learning:

If it was at an actual art exhibit, it would be another story, but because it’s here, I would assume it has an educational background behind it. If it were somewhere else, then I wouldn’t. I would assume it’s an artistic. I think part of it’s the location, because it’s situated in a science based place, it’s about learning, it’s about solidifying knowledge.

**Science centre as a place to present relevant issues.** The *Body Worlds & The Story of the Heart* presented visitors with healthy and diseased organs in order to convey the message of the importance of healthy lifestyle choices. Visitors identified the science centre as a place to present relevant issues to the public. Luca and Janet, actuaries in their twenties, described the science centre as a place for specific science learning that was present-day focused, as opposed to historically oriented:

Luca: But I think it’s more fitting along the lines of science rather than just the Royal Ontario Museum where you see … just a mash …

Janet: There’s a real blend of things there.
Luca: Yeah … I think it is better here because it’s more specific about what you are going to see.

Janet: And this place does seem to have more of a focus on education and that kind of thing than other places where it’s just general interest and historical, where the Science Centre is more forward looking about here and now. I think it fits quite well.

In addition to focusing on present-day relevant issues, George, a textile manufacturer in his forties, identified the science centre as a place to debate issues around science:

It’s important to have debate in science, as science is not only answers. Science has a lot of questions as well, even in 2010. There are some fundamental questions about the characteristics of water, for example don’t [sic] follow the rules of the physics that other things follow. Now they have new theories about why this is, but they’re just that, they are theories… I think science is not a black and white clear cut issue, and this is one of those exhibits that has a lot of science … there’s a lot of known things but there’s some unknown things. Like the soul. And what happens to the soul that is there? Is there even the existence of a soul?

There are many things that stir this debate. So I think it’s very much appropriate.

Zenia, an office manager in her thirties, identified the human body as science and described how “it’s not all understood.” In her view, the science centre was a place to present further information surrounding an issue not fully explained.

Presenting relevant issues to visitors was identified to be useful and important for visitors to the science centre. Stacy, a records specialist in her twenties, and Jill, a stay at
home mother in her twenties, agreed that presenting relevant issues were important to preserving life:

   Interviewer: Do you think this is an appropriate exhibit to have at the Science Centre?

   Stacey/Jill: Definitely.

   Stacey: I think … especially focusing on the heart... there’s so much heart disease.

   Jill: Yeah, they said that the heart disease is one of the biggest killers in North America. So, it’s definitely something ….

   Stacey: I think it’s important to learn how it works and how to prevent it from failing on you. Basically it’s one of the main parts that keep you alive. What’s the point in living only until 40?

   **Science centre as a place for hands-on activities.** Visitors reinforced the view that present day science centres predominantly display interactive, hands-on exhibitions. They identified the ROM and AGO to be places of contemplation where objects are observed as opposed to being touched, like at the science centre. When Molly considered the ROM or AGO she said, “then it's more like it is on display [at the AGO or ROM]. The Science Centre to me always seems to me to be ‘hands on.’ The other places… you look and you read” (40 – 49 year old, TTC driver). A visitor reinforced the view of the science centre as an interactive place writing, “Very interesting but too long with too little to do for the science centre” (Book 6, p. 55). Jill, a mother in her twenties, also compared the hands-on nature of the displays with static objects in an art gallery; “…the Art Gallery. To me... that’s more of sculptures and paintings and all that kind of thing, rather than
being educational hands on.” Celine also described the nature of the science centre exhibits implying their interactivity saying, “I think it could even be at the ROM...But the Science Centre offers a lot of other... things like testing a lung, or blowing into a machine, seeing your reaction to things and how your body reacts.”

Discussions with interviewees reinforced the presentation of the *Body Worlds* exhibition as a cabinet of curiosity, i.e., something to gaze upon (Pitman, 1999), instead of an interactive display. Visitors described how the exhibition used lighting to illuminate the figures, “...it’s lit certain ways to draw your attention while you’re walking through, or you enter a room and your eyes immediately hit three or four points because they are lit specifically for that and it pulls you in” (Ford, 50 – 59 year old, graphic designer). Katrina, a teacher in her forties, spoke of how the exhibition medium invited quiet contemplation as opposed to energetic play often incited by interactive displays: “I think it’s because this is real life as opposed to simulations... I think this would have to be viewed as something quiet or... low keyed, as opposed to something active and high keyed.” Ford, a graphic designer in his fifties, described *Body Worlds* to be a predominantly visual display and spoke of the plastinates as models alluding to the lack of interactivity in the display: “When I say ‘aesthetic’... it is an exhibit so it’s visually based... which just from that in itself suggests that it has to be aesthetic somehow. Somebody has taken scientific data and presented it in a living model.” Ford, further described his experience, reinforcing the plastinates as objects to be gazed upon. “It’s like as if you are watching or looking at pieces of art. You can only contemplate standing in front of it. You really can’t do much else...Sort of adult time...” When referring to
children, Ford described their short attention spans and the difficulty in presenting an exhibition that only involves observing objects:

…it wasn’t presented to them as being something of interest. It was something to gawk at and keep their attention, keep them engaged but not necessarily in a positive way to make them think about things. So that’s sort of a negative side.

With regards to the lack of interactivity, Mina shared, “It’s not a place for conversation, I don’t think” (40 – 49 year old, custom coordinator) while George, a textile manufacturer in his forties, said, “I prefer more the library atmosphere, the quiet, the personal reflection...” Visitors noted the static and quiet display to be contrary to the hands-on approach normally found in science centres.

**Science centre as a place for children.** In addition to learning and interactivity, visitors described the science centre as a place for children and families to visit. Katia, an administrator in her fifties, shared,

I think here you are going to get the kids and you’ll get the full family going through and the parents are explaining... because you could hear it in there, the parents were explaining to the kids what this was as we’re going through it.

Yannis, an engineer in his forties, also identified the science centre as a place for children: “It’s a different type of exhibit though. The rest of the Science Centre is more for kids... there are quite a few small kids, but I don’t think they understood what was going on, they just kind of moved around quickly.” When describing her husband’s reasons for declining to attend the *Body Worlds*, Molly, a TTC driver in her forties, shared that he viewed the science centre as a child centred activity: “He’d come with his grandchildren. He’s not going to come for himself. He’d come as a family activity. But
just him and I coming out together, no. He’d rather do adult activities. This to him would be a child activity.” Even though the science centre is seen as a place for children and family, some visitors identified *Body Worlds* as being an exhibition for adults. Ford, a graphic designer in his fifties, shared,

I feel this place is the better or best venue because of the audience that you would attract and the amount of coverage you would get that way, but it isn’t necessarily the best venue for people who like to observe and contemplate. It’s great for parents and kids, but... I notice most people would be adults because it’s more of an adult subject.

A few interviewees expressed concern as to whether *Body Worlds* belonged at the science centre due to the number of children that attend. When asked about the appropriateness of the venue, Natasha, a student in her twenties, responded, “To a certain extent. I don’t really think the *Body Worlds* exhibit is for certain kids.” Here visitors identified the science centre as a place predominantly for children and speculated on the age appropriateness of the exhibition, with conflicting views. Bob, a truck driver in his fifties, shared, “I did think it was kind of weird because there was [sic] a lot of kids in there, way younger than puberty age. So, they’re seeing this kind of stuff, and I don’t know whether that was age appropriate for them or not. Not my call, obviously.” Maria likewise openly contemplated an appropriate age group to visit the exhibition but could not determine an ideal age:

I think it is appropriate for adults, definitely, I would recommend it and come again, but I think back and I was watching the kids that were going through. I’ve got a very curious 3 ½ year old, I think … he would have been totally into it, but I
would have feared that he would have had nightmares about it. So, I don’t know about... allowing what age to go in.

Parminder, a communications worker in her forties, identified taking cues from the child as to whether or not they could handle the exhibition:

...you see kids in there too, and I think it’s great for them… as long as they can handle it, but obviously, if I brought my child and they were distressed, I would take them out. [They] have to be a certain age of maturity, maybe, but that’s up to each parent, and up to each individual. Even different people will react differently to it. If you feel discomfort leave… I think it is totally appropriate for the Science Centre, I’m glad they had it.

Science centre as a place of credibility. Science has often been viewed as a subject of uncontestable facts that are reliable and valid (Hodson, 1998). Visitors to the science centre reinforced this view describing the credibility the science centre brought to the Body Worlds exhibition. Visitors contrasted this with placing the exhibition in an art gallery speaking of how the gallery would turn it into a spectacle.

Some visitors disagreed with displaying the exhibition in an art gallery, as they viewed the exhibition to be scientific: “I think the Science Centre is better, because there is science behind it” (Sabrina, 20 – 29 year old, student). Bonnie, a nurse in her thirties, said, “It would detract from its credibility if it was in an Art Gallery,” and suggested placing the exhibition at the University of Toronto medical school. Clint identified, “science has got more integrity. As cool as it is, they’re still human bodies, and there’s a certain amount of dignity that they have to be given. I think science gives them that dignity” (30 – 39 year old, wildlife removal). When speaking of placing the exhibits in
the art gallery, Clint said, “I would hate to see it cheapened.” Amanda, a student in her twenties, shared how she saw the art gallery and museum to be places for entertainment and not science: “I really think that if you can appreciate it from a science perspective... and it’s not just pure entertainment, then I think this [the science centre] is more of an appropriate place.” Janet, an actuary in her twenties, spoke of how she would not visit the exhibition if it was presented in an art gallery. In her view the art gallery brings ambiguity to objects, while the science centre brings science to it making it more interesting:

I think if it was in an art gallery, we probably wouldn’t have gone to see it. When something becomes art it’s just kind of like what defines art? What counts as art?

But I think when you present it as more of a scientific aspect, it would, for me personally, be more interesting than art.

Catherine, a manager in her sixties, reinforced not displaying the exhibits in an art gallery “...because I don’t think people would look at it the same way... it’s more about the body.”

**Science centre as a place for artistic display.** Often visitors spoke of and wrote about the blurring of the line between science and art. Visitors described how the *Body Worlds* exhibition could be science and art simultaneously, confirming von Hagens’ description of his exhibition to be both. Many comments in visitor books described the blend of science and art: “An eye-opening and life transforming experience. Remarkable work of science and art” (Book 10, p. 29); “Very informative and visual. The art and education mixed together like a fine symphony. Thanks to those brave and generous enough to donate their bodies so that others can learn and appreciate our human form...”
“Seeing a person’s exposed body is difficult at first then, intriguing. This exhibit displays the human body with the perfect balance of art and science” (Book 2, p. 46).

Some visitors identified that the display could be included in an art gallery due to its artistic nature. Margaret thought the exhibition could be at both the science centre and art gallery. She speculated on the appropriateness of the art gallery venue; “Just because of the artistic nature of the displays. They are very artistically displayed. They are not just laid out. They are all doing something. They’re all displayed as who they are and what their life is about...Beautiful.” Kasia, a student in her twenties, could see the exhibition displayed in the art gallery saying, “...some of the poses of the people. I could see that being kind of artsy.” Lana, a photographer in her thirties, spoke about Body Worlds being presented in a number of venues. She responded to the question of whether Body Worlds was appropriate for the science centre with:

I think it’s appropriate because it’s trying to mix the science with the art, but it could also be an exhibit that could travel elsewhere. Like why couldn’t it be at the AGO? Why not? It could. I think because he has positioned himself this way, he could be in a multitude of places. He is not just restricted to just Science Centres. I think that [his plastinates] could be in art galleries.

The Science Centre created a “Sketch Night” event with Body Worlds where the public was invited to attend and sketch plastinates and live models. The exhibition was altered, with walls removed to make the space more open and less compartmentalized. In addition to the plastinates live nude models posed next to bodies contrasting life with death. The atmosphere was very different from the traditional Body Worlds display.
Instead of the sound of the heartbeat, Jazz music played in the background and the smell of coffee wafted through the air as a small coffee cart was opened near the exhibition. Rather than a dark display, lights illuminated plastinates and additional lights were turned on so that artists could see their own sketches. Artists were scattered throughout the exhibition, sitting on the floor or standing, drawing both plastinates and live models on sketch pads and tablets. Artists were engaged with their own work, and so there was limited discussion or interaction between the visitors. Of the three visitors who were interviewed on this evening, all appreciated the event but identified how this was a select group of visitors interested in both science and art: “This is an unusual group who’s here tonight who’s interested in both [science and art] (Colleen, 60 – 69 year old, artist). When asked to classify the exhibition Angelo, a sculptor in his forties, shared, “It’s a combination [of art and science], he [von Hagens] tried to... show… the human body through art, the artist’s way. The way he visualize[d] it. His vision is this way. If I would be in his place, I could have done [it] differently.” Mark, a children's illustrator in his forties, identified how some of the plastinates were explicitly artistic because of the absence of labels:

That one holding the heart, that’s definitely art [referring to the first plastinate kneeling and holding a heart]. I don’t consider it science because there wasn’t any labels or anything like that and when I think more scientifically, there would be labels mentioned about the quadriceps, the deltoids and all the body parts and actually explain a few things...

When describing the art content in the exhibition, Colleen suggested,
I understand the art that goes into preparing a museum exhibit, but I think the first layer, shall we say, is science and then you realize that there’s a lot of art that goes into preparing museum exhibits. But people don’t think of that. They think about the science.

The lines between science and art seemed to be blurred in this exhibition as identified by visitor responses.

In addition to commenting on the venue itself, interviewees often speculated on what they would have liked to have seen within the *Body Worlds* exhibition. Visitor responses here served to support visitors assertions of what kinds of exhibitions could be found in a science centre, and relayed insights into factors involved in an effective science exhibition. These are discussed in the next section.

**Visitors’ Suggestions for Improving the *Body Worlds* Exhibition**

Throughout interviews and in comment books, visitors identified how the exhibition could be modified to make it more effective. Although this was not the focus of this research or a research question, I include this section because it reveals something about the nature of exhibitions and the visitor experience. Moreover, these suggestions may impact visitor meaning-making. Suggestions to enhance this exhibition included a travelling exhibition and the use of tour guides or more opportunity to speak to docents. Some visitors described a desire for an interactive and multimodal display, as well as further information about the plastinates themselves. Below, these suggestions are discussed in detail.

**Travelling exhibits.** In addition to the science centre, museum, and art gallery, some visitors identified other venues that would be appropriate for this exhibition. Here,
visitors proposed the idea of a travelling exhibition, able to visit smaller cities or classrooms. RoseAnn, a hospital employee in her fifties, said,

    I think it’s good here, but it would be even better if it could travel in a truck and trailer kind of situation... so that it could go sort of place to place and show people, because it’s got … so much there, that for a grade 11 or 12 class for biology... that’s huge, huge stuff to really see what you are talking about and learning about...

Tim, a student under twenty, who was visiting with RoseAnn added,

    ... my grade 11 biology teacher, he just got back from the expo, it was in Las Vegas... He brought back the magazine and was pointing out all the different [pictures] of actual humans, so if we could have had that …that would have been very insightful at the time, for sure.

Some visitors also suggested the usefulness of having the exhibition at a university or college to meet the needs of medical students, Faculty of Science students, or students in the Faculty of Arts. Mark, a children’s illustrator said,

    ...if it was possible, to bring it on the road and bring it to different universities and colleges. They would love that.... I can see, especially biology, them really being able to appreciate [it]… they would walk through and go “really cool,” and take some close up shots, probably want to take some photographs, and then they would kind of digest it. Whereas if it was Fine Arts again they would bring their sketch books and actually draw from it, draw from the reference. So it would be those two different purposes.
William, a photographer in his thirties, also spoke of the usefulness of plastinates for medical students, describing their ability to “better... the medical community by providing such models and being able to educate medical students.”

**Docents.** Scientists were available throughout the *Body Worlds* exhibition to provide additional information to patrons. Usually, about two scientists were present at any given time to answer questions. A visitor wrote of how they wanted “a medical person to explain [the] body” (Book 6, p. 54). Bianca, a sales rep in her twenties, advised that a docent or tour guide would be useful saying, “Especially for kids... you almost need someone to take you around and explain it, as opposed to read this poster. Read this other one. I feel if it were more interactive, then they would take more from it…..” Comment books also held comments of visitors wanting docents to take them through the exhibition: “Amazing exhibit... It would be great to have a tour or a talk around the exhibit” (Book 3, p. 303).

**Multimedia and interactivity.** Visitors expressed a desire to observe more multimedia presentations within the *Body Worlds* exhibition, as well as engage in more hands-on interactive activities. One visitor commented, “Good displays. Would be cool to have some real samples on slides to see in microscopes and videos of surgeries etc.” (Book 10, p. 10). Parminder, a communications worker in her thirties, spoke of her own experiences with the science centre and her desire to observe a film. She commented on the fact that small ‘alcoves’ with short films were not present as in other science centre exhibitions she visited:
…the Science Centre had these little alcoves where you can go in and watch a little movie and then come back out, that they would have one that would profile him [Gunther von Hagens], and why he does it, and what motivates him to do it. Molly, a transit worker in her forties, also wanted to see a movie that would summarize the *Body Worlds* exhibition. Hamas, a student in his twenties, described wanting the exhibition to be more multisensory: “If they can do it multisensory, I think everyone would learn way, way more... Visual, kinaesthetic.” Likewise, some visitors also expressed wanting more kinaesthetic experiences. Molly said,

You know the part about the muscles and how it’s like a contraction and how one muscle goes down and the other comes up, and that’s going to stick, and that sort of thing, but it would have been kind of fun to have sort of a display or something to show exactly how the muscle moves the bone. Rather than just looking… more hands-on interactive.

Katrina, a teacher in her forties, also wanted a more hands-on experience for children saying, “It would have to be interactive, hands-on sort of thing.” Further, referencing children, Mick suggested that a smaller exhibition especially for children could be beneficial:

Maybe a student portion … smaller, more refined, less to look at. Still moving around so the option to hold things, but more focused on a couple of things rather than ‘here’s 150 different things for you to look at. Go!’ Adults can pace themselves and walk through it, but kids just get all wacky. (20 – 29 year old, sales)
Another visitor wrote about the need to have an interactive display for children: “I would have enjoyed it more if it were more kid accessible – I kept having to lift the kids up. Also – plastic replicas for people especially kids to touch would have been a real hands on learning adventure” (Book 1, p. 9).

**Further information about plastinates.** Through conversations with visitors, observations, and in comment books, visitors described their desire to know more about the plastinates. Visitors were interested in the age, weight, reason for donating their body and why they died. A comment in Book 8 read, “Should include a card detailing age, cause of death, and life style choices of the bodies” (p. 440). “I am also interested in the stories behind the people who donated their bodies. Who were they? Why did they donate their bodies? How did they die?” (Book 8, p. 178). Also wanting to connect with the plastinates further, a visitor wrote,

I wish it spoke more to the way the individual died or the observable illnesses that the individual had. I think it becomes more tangible and educational when you can relate the person to their medical history. Not putting a face to the parts, but at least a history to the condition of the parts. (Book 6, p.69)

Hassan, a student in his twenties, spoke of how personalizing the plastinates would make them more interesting:

I would have liked to have known maybe their ages, and how they actually did die. Like the one where the obesity revealed part, where it told you how heavy he was and how he ended up dying, that interests me... I think it gives them more of a person aspect, because then you refer to that man as ‘oh, he died when he was 50,
he wasn’t very old at all.’ Then it kind of gives you more of an interest in his actual problem that he had.

Yiola, a student in her twenties, identified the usefulness in knowing more about the plastinate saying, “It would be more personal. People can compare it to themselves and the people they know.”

Mina, a custom coordinator in her forties, described her desire to know more about the soul: “I really asked where is the soul?... I see that science comes... to provide a lot of knowledge about ...the human body, but I still have the question about that [the soul]. And I don’t know if I can answer that… if someone can answer me.”

**Further information on process.** In addition to detail about the plastinates themselves, some visitors wanted to know more about the process of plastination: “Would have liked to learn more about the process” (Book 10, p. 30). Parminder, a communications worker in her thirties, spoke of her desire to learn more about the process of plastination:

> The one thing I think that was lacking was I really think they need more information on... the process, and on the person who’s doing it, and why he does it, because you walk in and you go ‘wow, that’s interesting...’ I was really hoping... [to] watch a little movie… one that would profile him, and why he does it, and what motivates him to do it.

Jen, a service representative in her forties, spoke of how she was also interested in learning about the entire process of creating a plastinate: “I’d like to see how he does it from beginning to end.” Stephanie, a student in her twenties, spoke of her desire for more information regarding the process of plastination: “I think it was well done, in general...
the only thing I would say would have been nice... Just have a pamphlet, you choose to read it if you want, or have, where you can know the process a little bit better.”

This chapter presented interviewee conceptions for the role and purpose of the Ontario Science Centre and science centres generally, as well as their suggestions for improving the Body Worlds exhibition. Visitor responses offered insight in the changing role of the science centre and the nature of their exhibitions. In the section that follows I provide a discussion related to the findings presented in this chapter.

Discussion

This section presents discussion for research question (c): Within the context of the Body Worlds exhibition, what does this type of exhibition convey about the changing role of science centres and the nature of their exhibitions? This discussion begins by comparing and contrasting the Body Worlds exhibition with historical museums and the present day science centre, and follows with an examination of visitor perceptions of science centres and the nature of their exhibitions.

The museum has changed dramatically from early classical times to the present day and researchers continue to examine how museums can better serve the public (Anderson, 2004; Cameron, 1971; Pitman, 1999). Traditionally, highly personal collections were on display in museums for invited aristocrats and scholars to enjoy (Pitman, 1999). These cabinets of curiosity held objects such as jewels, heirlooms, and other collections that held great meaning for their owner. These ancestral museums (curiosity cabinets) were haphazardly displayed and placed behind glass cases to ensure a “look but don’t touch” feel. Over time, the museum transformed into first generation
museums which contained subject-based ordered displays that were opened to the general public (McManus, 1992). Industrial exhibitions dominated during the first generation era as these museums used objects to educate the public in science. Second generation museums became places promoting science, technology and industry, and were considered to be university and industry training sites, housing authoritative scientific information. Visitor engagement and entertainment became important as these second generation museums were influenced by the local fun fairs (McManus, 1992). Third generation museums became the hands-on science-technology centres, where visitor engagement and manipulation of exhibits play an important role. This generation of museums is less concerned with object contemplation, but instead strives to share ideas and concepts through an interactive approach with a goal of public education (McManus, 1992).

Cameron (1971) described the transformation of private to public museums to be democratic. “Reinventing the museum symbolize[d] the general movement of dismantling the museum as an ivory tower of exclusivity toward the construction of a more socially responsive cultural institution in service to the public” (Anderson, 2004, p. 1). The new democratic museums strive to be agents of social inclusion that tell stories of contemporary relevance (Conn, 2010; Sandell, 2000). In the case of Body Worlds, Von Hagens’ democratizes the human body by allowing visitors to experience what they normally would not – a look inside of a cadaver (Institute for Plastination, 2004). Conversation with visitors about this controversial and unique exhibition, revealed some insights into the changing role and nature of science exhibitions.
Findings in this study suggest that *Body Worlds* contains museum features of all generations of museums, including its ancestral form. *Body Worlds* is comprised of Dr. von Hagens’ creations of static artefacts where exhibits are located within glass cases or are roped off so that visitors may gaze upon these objects, resembling traditional curiosity cabinet displays. As the mastermind and creator of the process of plastination Dr. Von Hagens has complete control over decisions involved in creating his exhibitions, and so exhibits on display represent his own personal collection. At the same time however, *Body Worlds* takes a deeply personal subject (both the literal human being and visitors’ personal conceptions of their own body) and makes it available to the general public. In this way, the *Body Worlds* exhibition incorporates characteristics of first generation museums – the display is subject specific and object focused. The technology of plastination demonstrates scientific advancement, much like the industrial expositions did. The macabre and boundary pushing of the display demonstrates how the second generation museum feature of entertainment and novelty is a central feature to this exhibition. School groups often visit this display to learn more about the human body, demonstrating the role of the science centre as a place to disseminate scientific information located within the display. Finally, features of the third generation museum are present, although may not be obvious at first. While the overwhelming majority of exhibits are static objects, few interactive stations do exist (e.g., organ manipulation table, computer simulations). *Body Worlds* presents contemporary issues of health to the public, paralleling the focus on ideas in third generation museums (McManus, 1992). It is apparent that *Body Worlds* incorporates features across all four stages of development towards the modern day science museum. While the majority of data collected in this
study supports contemporary conceptions of third generation science centres as places of exploratory, hands-on, active sites for learning (Fitzgerald, Yezril, & Dial, 1997; Gilbert & Stocklmayer, 2001), the structure of the *Body Worlds* exhibition, for the most part, does not employ these display methods. Instead *Body Worlds* uses a combination of characteristics for displaying exhibits that span across all four generations of museums.

Surprisingly participants in this study supported and endorsed the elements of the traditional scientific display experience. Specifically, although a static display, participants noted the value of the exhibition as a site for meaning-making that was accessible to many age groups and demographic backgrounds. Of importance was the recognition that presenting *Body Worlds* in a science centre provided credibility to artistic representations of relevant and authentic issues related to the body and human existence. The unique features of this exhibition were the dual nature of the display as both science and art which may have compensated for the lack of tactile experiences. In the following sections I revisit the themes reported on earlier and elaborate on the key features of science exhibitions described by participants at *Body Worlds*.

**Science centre as a place of science.** The general public has the opportunity to learn about science through both formal schooling and informal experiences (i.e., television, radio, libraries, museums, special events etc.). Falk, Brooks, and Amin (2001) identified public perceptions of sources of scientific and technological knowledge; participants ranked museums as fifth, behind school, books, life experience, and TV, demonstrating their view of the museum as an important source of information. Visitors to *Body Worlds* similarly identified the science centre, a subset of museums, as a place that holds scientific information, contrary to the art gallery which in their view is a place
to observe artistic works. Many visitors equated the *Body Worlds* exhibition with science and as such thought the science centre to be an appropriate venue for the display.

Interestingly visitors identified that the science centre primes one to learn science, whereas, the art gallery and museum prepares visitors for different experiences. Some visitor conceptions reveal art galleries, museums, and science centres house very specific types of information that are compartmentalized and do not cross institutional boundaries, however it is important to note that not all visitors had this view.

Given the title “Science Centre” it is not surprising that visitors equate this with being a place of science. Public mission statements identify science and technology as being an integral component of science centre mandates. The Association of Science - Technology Centers (2007) describe how “science centers connect people with science” (About science centers, para. 1). Subsets of the museum seem to become experts in a particular area of study (e.g., the art gallery in art, the museum in history etc.), and interviewees in this study recognized the science centre as a place that represents science.

**Science centre as a place for learning science.** Over time, the science centre has been identified as a place to learn science (Bybee, 2001; Lederman, 1998), and recently as a place to learn about the social implications of science and technology (Pedretti, 2002). The conception of the science centre as a place to learn has been identified by the Association of Science - Technology Centers (2007) which states that visitors will “experience the pleasure of lifelong learning...” at these centres (About science centers, para. 1).

Macdonald (1998) studied the exhibition *Food for Thought* created for the Science Museum in London, and identified that for the most part visitors “were not
looking for specific information, but were, rather, on days out, hoping to add an
educational dimension to what was primarily a leisure activity’’ (p.131). Visitors to *Body Worlds* similarly identified the ‘educational dimension’ inherent to the science centre.

Implicit in visitor talk surrounding *Body Worlds* and its venue, the science centre was identified to be a place of learning, for students, children and the general public. Visitors described many instances when they saw parents using the exhibits to teach their children about the body. Likewise, science students and medical practitioners identified themselves as facilitators for their groups, offering additional information where necessary. Interestingly, many visitors contrasted the art gallery with the science centre stating that if *Body Worlds* was presented in an art gallery it would not necessarily encourage learning as the science centre does.

Visitors to *Body Worlds* viewed the science centre as a place to learn something new or solidify pre-existing knowledge. It was evident that many parents and teachers intended to help their children and students learn about the human body using exhibits on display. Likewise, university students described their intent to consolidate information learned in class. Visitors shared how they gained further insight into loved ones’ illness, health-related practices, and ailments. Data collected in this study demonstrated that visitors made relevant connections with exhibition content and their personal lives. Through talk with visitors, much was gained about their insight into contemporary health-related issues (smoking, heart disease, obesity etc.). Visitors spoke of choices they had made or intended to make, as well as commented on identified controversial issues located within the exhibition.
Visitor meaning-making of *Body Worlds* offers insight into the potential contribution that this specific exhibition may make to develop scientific literacy for citizens in its broadest sense. In line with Shen’s (1975) identifications of three different types of scientific literacies: practical, civic and cultural, it appears that visitor meaning-making of *Body Worlds* contributed to the development of all three in some way.

Practical scientific literacy is the ability to use scientific knowledge to solve practical problems while civic scientific literacy enhances awareness of scientific issues and allows decisions to be made in a democratic manner (e.g., climate change, use of stem cells in research, exercise in schools etc.). Culturally scientific literate people are motivated to know about human achievement in science.

When considering practical and civic scientific literacy *Body Worlds* had visitors speaking of specific content gained and how this information would influence their future decision making. Visitors often referred to the comparisons of healthy and diseased organs and described how this would inform decisions surrounding exercise, healthy eating and stress reduction. When considering cultural scientific literacy many visitors to *Body Worlds* left wanting to know more about Dr. von Hagens, his motivation for his work, and the process of plastination.

Hodson (1998) offers another framework for thinking about scientific literacy. He suggests science literacy incorporates: 1. ‘learning’ science (acquiring conceptual understanding) 2. ‘doing’ science (engaging in the process of inquiry and problem solving) and 3. ‘learning about’ science (developing an understanding of the nature of science and interactions among science, technology, society and the environment). Since visitors expressed their desire to know more about the process of plastination, and von
Hagens’ reasons and motivations for continuing with this endeavour, it appears that the opportunity to teach about the nature of science and more specifically ‘learning about’ science, as Hodson (1998) suggests, was missed. Kolsto (2001) argues that learning about science should include opportunities to explore learning about the social process of science, limitations in science, values in science, and the critical attitude required by scientists. Since Body Worlds only presented static cadavers, void of process, decision making, and dialogue that occurred to create the display, Hodson’s (1998) comprehensive view of exhibitions that may develop scientific literacy in patrons was not fully developed. Future research examining scientific literacy and science exhibition design (in this case static displays, compared to hands-on displays) could inform curators as they attempt to create exhibitions that serve to maximize developmental potential in the area of scientific literacy.

**Science centre as a place to present relevant issues.** Koster (2006) writes about the importance of pursuing increased relevancy for patrons when considering museum transformation. Specifically related to the science centre, Pedretti (2002; 2004) has described how science centres have begun to include contemporary socio-scientific issues-based exhibitions. Presenting issues-based exhibitions offer science centres the opportunity to include teaching about the nature of science and presenting science in its larger social, cultural and political context (STSE connections) (Pedretti, 2002). Transforming the museums involves enhancing relevancy (Koster, 2006), and presenting issues-based exhibitions that bring contemporary scientific issues to the public. As Rennie and Williams (2006) write, “people are unlikely to feel their ideas have been
challenged unless they are confronted with science in more socially relevant and controversial contexts” (p. 890).

Visitors to the *Body Worlds* exhibition identified contentious issues located within the display. As visitors responded to the display, their highly personal connections and beliefs emerged suggesting the exhibits were relevant to their own lives. Visitors’ responses included very specific life experiences and explicit connections to the display. Visitors acknowledged the importance of the science centre as a place to present relevant contemporary issues. In their view, the science centre was not a place to display historical information, but rather a location for present day focused scientific information. Visitors appreciated being able to relate *Body Worlds* content directly to themselves supporting Kerr, Cunningham-Burley, and Amos’ (1998) assertion that: “science is relevant to a person’s life when they think that it directly affects them and when they feel they have the opportunity to influence the way in which it affects their lives” (pp. 43–44). Visitors to *Body Worlds* identified the content relevance related to healthy lifestyle practices and reflected upon how their own actions and behaviours could impact their own longevity and mortality. Visitors’ positive responses to the display of contemporary issues suggest that science centre reformation incorporating socio-scientific issues is encouraged and well received.

**Science centre as a place for hands-on activities.** Traditionally museums held displays that allowed visitors to “gaze reverentially and deferentially at sanctified objects” (Macdonald, 1998, p. 124). The science centres introduced in the sixties however, encouraged visitors to become active participants in their experience through the use of hands-on interactive displays. *Body Worlds* however, does not reflect this
approach to exhibition design. Instead, objects are presented in glass cases, with the intention that they are looked upon and not handled: “While you will be able to get very close to the plastinates, as a rule, visitors are not allowed to touch them” (von Hagens, 2012). With the exception of one table holding three organs that may be touched or held by the visitor, the rest of the exhibition is meant to be gazed upon, running contrary to the hands-on display methods used by science centers. Here, visitors were exposed to traditional display methods reminiscent of curiosity cabinets. Despite this format, visitors responded positively to the display and made very personalized meaning of the content on display.

Mintz (1995) reported on issues-based exhibitions and identified the difficulty in presenting these usually non-phenomenon based topics as a hands-on, interactive display. Rather, they are usually heavily text based as they present multiple viewpoints of the issue at hand. *Body Worlds* presents the issue of sustaining health to the public, and yet is neither interactive, nor heavily text based. Instead the objects on display are meant to speak for themselves. As the title of the exhibition implies, *Body Worlds & The Story of the Heart* presents a narrative of the human body through visual display. Illness and health are presented side by side so that the viewer is able to evaluate the consequences of poor eating, smoking or exercise habits by gazing upon comparisons of healthy with diseased bodies. Visitor responses indicated the effectiveness of this mode of display.

Students visiting the *Body Worlds* exhibition identified the value in learning from “real” objects as opposed to viewing pictures in a textbook. In 1978 the AAM expanded its definition of “objects” to include items made specifically for science centres i.e., installations made to involve visitors in an activity surrounding a phenomenon (Guiran,
1999). In *Body Worlds* however, objects represent traditional object displays found predominantly in museums – objects that are to be gazed upon rather than manipulated. The objects on display in the *Body Worlds* are not meant to be manipulated, and yet visitors still identify the value of these objects.

In light of visitors’ positive reactions to these objects, this suggests that science centres can create effective exhibitions that are still viewed as learning tools, in the absence of interactivity. Evidence from this study suggests that visitors were engaged with exhibits; however, there could be a number of reasons for this. The medium itself – a human cadaver, makes this exhibition universally accessible. Visitors may have produced sustained interest due to fact that they were looking at an object that they themselves “own.” The controversial nature of this exhibition may also have served to sustain attention and produce engagement. Visitors openly spoke of identified issues located within the display and shared their own personal views and beliefs. Humans are naturally curious, and the *Body Worlds* exhibitions continue to produce new exhibits in more controversial and creative poses. Future studies with *Body Worlds* could explore what precisely visitors find so fascinating. Is it the scientific content or how von Hagens’ continues to push the boundaries of display? I suggest it is both, which supports the view the museum visitors are looking for a combination of education and entertainment i.e., “edutainment.”

As Gilbert and Stocklmayer (2001) articulate: “As far as we are aware, nobody has ever claimed that the interactive exhibit is the ‘only way’ to portray scientific ideas” (p. 49). *Body Worlds* is a specific case that demonstrates the success of a static display in
promoting meaning-making for visitors in the area of the human body. As Silverman and O’Neill (2004) note when describing the interaction between visitors and objects:

The denial of the complex interaction of visitors and objects also can be found in another ongoing and futile opposition between objects speaking for themselves and objects requiring interpretation. Proponents of the former often seem to be unaware that visitors must have a vast cultural background before objects can appear to speak for themselves. On the other hand, museums dominated by graphics, text, and computers can obscure the resonance of objects. There is no easy rule for balancing both sides. If the objects cannot convey a significant part of the exhibition’s story, then perhaps the museum is not a suitable medium for the topic. But if the objects can help to tell a story, they should be supported in ways that enable communication with a range of audiences. Every piece of communicative apparatus—from exhibit labels to computer terminals—should foster interaction between people and objects and direct attention to the resonance of the objects. (The Collections versus the Public, para. 3)

Since the Body Worlds exhibition makes use of tactile, auditory, and visual display methods, future studies examining visitor responses and interactions with these specific components of the exhibition set up may offer insight into the balance necessary to produce an effective static display within the science centre. What is apparent from the data in this study is that the science centre is a place where, under the right conditions, objects can mostly speak for themselves, where hands-on, interactive exhibitions are not always necessary. The case of the Body Worlds exhibition showcases that the science
centre is open to, and successful, when housing exhibitions that do not fully support their interactive mandate.

**Science centre as a place for children.** Mintz (2005) reported that “the foundation audience in most science centers is families with young children under the age of eleven” (p. 272). She notes that parents often take their children up until the age of twelve, and re-visit the science centre when they have grandchildren who are between the age of 5 and twelve. Science centres often target children in their marketing campaigns boasting being “fun and exciting, playgrounds for the mind” (Mintz, 2005, p. 271). Verbs are often used in campaigns (i.e., explore, create, discover, build, try) emphasizing the hands-on interactive approach meant to make for a wonderful and fun time for children at the centre (Mintz, 2005).

It was apparent from interview data, comment books, and observation that the science centre is a place for families and children. Many school groups and families with children were seen to visit the exhibition and visitors spoke of the how presenting *Body Worlds* in the science centre, instead of an art gallery or museum, would offer the opportunity to expand the target audience to include children. Interviewees indicated that the hands-on nature of the science centre made it an appropriate place for children to discover new things. It should be noted however, that many interviewees questioned the age appropriateness of the *Body Worlds* exhibition and often questioned whether age restrictions were in effect. Oftentimes interviewees openly debated whether children should be allowed in the exhibition due to the graphic nature of the display. It became apparent that visitors viewed the science centre in general as a place for children, but many struggled with the appropriateness of the *Body Worlds* exhibition for children.
The Fifth Science Center World Congress that took place in 2008 recognized how children have the potential to become future agents of social change and so included developing scientific literacy skills in its broadest sense as its mandate for both children and adults. Through observations within the *Body Worlds* exhibition, it was apparent that parents, teachers, and docents took considerable time speaking to children and answering questions they had about the human body. Children were often seen to look in awe at plastinates and organs, and often had questions for their guardian. It was evident that *Body Worlds* provided an opportunity to educate both adults and children about the human body. Mintz notes the importance of science centers as a place for children:

> Science centers are community resources that empower parents as advocates for their children’s learning. Through content-rich exhibitions and programs, parents and children can learn together. Science centers partner with schools and expand the learning resources for families. Through after-school programs, vacation and summer classes, parents are able to expand the experience base for their children. This enhances the educational infrastructure for the entire community. (2005, p. 278)

While only school groups at the high school level were seen within the exhibition, younger children were accompanied to the exhibition by their guardians. Commonly found within interviews was the belief that parents knew their children best and as such would be able to make an informed decision of whether *Body Worlds* would be an appropriate exhibition for them to attend. Interviewees were not opposed to children visiting the exhibition, supporting Mintz’s (2005) assertion that science centres have the potential to service the entire community, including children.
Science centre as a place of credibility. Visitor comments supported previous studies that suggest visitors view the science centre as a place of credibility that holds valid and reliable information (Hodson, 1998; Macdonald, 1998). Science centres are places of authority where “exhibitions tend to be presented to the public as do scientific facts: as unequivocal statements rather than as the outcome of particular processes and contexts” (Macdonald, 1998, p. 2). Representing science, void of social and political contexts, encourages the conception of science as authoritative and powerful (Macdonald, 1998). Rennie and Williams (2006) studied visitors to the science centre and history museum and found that visitors:

- arrived at the venue with moderately scientific views about the fallibility of scientific knowledge, but when they left they were more likely to think that science has answers to all questions, that scientific explanations are definite, and that scientists always agree with each other. (p. 886)

It would seem that the public’s lack of understanding about the nature of science, or how science functions, would contribute to their interpretation of science as infallible.

McComas (2004) argues that it is important to teach people about the nature of science including elements such as: science is open to review by others, is tentative yet durable, can be subjective, is influenced by culture, history and social circumstances, and cannot answer all questions. While this study did not examine changes in conceptualizations pre and post visit to the science centre, visitors did acknowledge the centre to be a place that affords credibility to the presentation of Body Worlds, contrasted with the art gallery which, in their opinion, could turn the exhibition into a spectacle.
The findings in this study speak to the importance of teaching visitors about the nature of science. In describing science museums, Baldock (1995) points out, “little, if anything, is said about the process of science – what it is, how it’s done, who does it, and why” (p. 285). Furthermore, she describes how science centres “fail to promote realistic images of science as they detach science from the people who do it – the scientists themselves, and the culture in which they interact with each other and society” (p. 287). Visitors left the Body Worlds exhibition wanting to know more about von Hagens’ and the process of plastination. They identified the gap that Baldock speaks of – between the exhibition and its designer.

Rather than portraying science as holding absolute truths, as authoritative, objective, reliable, and powerful; void of social, cultural, or political implications (Hodson, 1998; Macdonald, 1998), it is recommended that the science centre take every opportunity to ensure that exhibitions include opportunities for the public to learn about the nature of science. Macdonald (1998) suggests that exhibitions be designed with “questions about production (encoding/writing) and consumption (decoding/reading), as well as content (text) and the interrelationships between these” (p. 4) so that social, cultural and political aspects involved in exhibition design be exposed. As Baldock (1995) articulates “exhibitions of artefacts do little to show the processes, ideas, and cultural effects which led to the production of the artefacts” (p. 287). By including further communication about the discovery and process of plastination and von Hagens’ motivations for building his enterprise, opportunities may be further developed for the public to engage with the nature of science. Incorporating the nature of science in science centre exhibitions may contribute to visitors’ ability to think critically about presentations
of science rather than simply affording the credibility inherent to science centres to the particular display.

**Science centre as a place for artistic display.** The blurring of the lines between science and art is highly evident in the *Body Worlds* exhibition. Art seems to permeate the display and is present in the creative design features including lighting, fonts, posters on the walls, and the plastinates themselves (i.e., poses, costumes, and gestalts). Science is also present within the exhibition through information posters, comparisons of healthy with diseased organs, and the medium itself. Visitors to *Body Worlds* acknowledged the art present within the exhibition; however interviewees presented divided opinions as to whether an art gallery was an appropriate venue for *Body Worlds*. The overwhelming majority of visitors agreed that the exhibition belonged in a science centre, suggesting that art could be present within a science centre, while a few thought that it could be presented in an art gallery. Some visitors described how the science centre affords credibility to the display, while the art gallery would turn it into a spectacle. Interestingly, the majority of visitors approved of art crossing institutional boundaries into the science centre to be incorporated into scientific display, but not the other way around. This study thus suggests a place for art in representations of science.

One potential success of this exhibition could be that the combination of art and science leads to new a form of engagement. Moore (2001) describes how science and art diverge, with art being a representation of a single person’s conception or viewpoint, while science requires consensus among many people in the field. He also describes the emotional quality that is often found in art, but not science which is instead presented objectively and “does not express the imagination and joy of discovery inherent in its
practice” (Moore, 2001, p. 1259). The case of Body Worlds demonstrates how a scientific display successfully overcomes the divergence of art and science described by Moore (2001). Von Hagens presents his own artistic representation of a scientific topic - the human body and health - in an emotional and thought provoking way. The success of the Body Worlds exhibition supports the idea that if science is presented “...artistically and imaginatively, as well as objectively and precisely, students[visitors] will develop a more complete understanding of what science and scientists are about - one that is likely to capture their imaginations, emotions, and best efforts” (Moore, 2001, p. 1259). Visitors’ positive responses to Body Worlds indicate the success of the exhibition in merging science with art when creating an exhibition of science.

The fact that science centres are showing Body Worlds within their centres and visitors are responding positively, demonstrates a place for artistic representations of science in the science centre. The visitors to the Ontario Science Centre saw the centre affording credibility to the display, which may not have occurred had the exhibition been displayed in an art gallery. When describing the changing museum for the 21st century, Silverman and O’Neill (2004) write: “some of the most engaging, refreshing, and educational exhibitions are those that merge and blend disciplinary approaches” (para. 30). The case of Body Worlds demonstrates how science centres, embracing displays that are both artistic and scientific, are able to field a larger target audience to attend their centres, and ultimately engage the public in scientific meaning-making.

The science centre also expanded its audience by holding an artist’s sketch night. While the success of this event shows that the science centre is thinking about ways to reach a wider audience, the targeting of audiences may also serve to compartmentalize
and segregate groups of visitors. Conversely, it is an effective marketing strategy that increases the number of visitors to the science centre. Further studies investigating the role of interdisciplinary exhibitions presented in science centres and the resulting visitor meaning-making with these exhibitions may help to shed light on whether this new form of engagement should continue to be incorporated into science centres exhibitions.

Summary

In summation, it was apparent that the Body Worlds exhibition was positively received by many of its visitors in spite of being a static and quiet display. Interviewees offered insight into the potential changing role of the science centre as it moves into the 21st Century. Not surprisingly, visitors perceived the science centre to be a place of learning scientific information and interestingly some visitors did view the Body Worlds exhibition content crossing institutional boundaries into the art gallery or museum as a positive move. The common perceptions of the science centre as being a place of credibility, for hands-in interactive displays, and as a place for families with children were maintained. What did emerge from the data, suggesting a change in the presentation of science, were views that the science centre is a place to present relevant and contemporary scientific issues. Instead of just being a place to engage in hands-on activity surrounding a scientific phenomenon, visitors acknowledged the importance and necessity for the centre to present relevant issues to the public. This parallels and supports work that has been done examining scientific literacy skills, especially Hodson’s (1998) idea of learning about science. Learning about science through issues-based exhibitions, as Pedretti (2002, 2004, 2012) asserts, offers ample opportunity for visitors to learn about the nature of science while making very personalized meaning of the displays.
The case of *Body Worlds* did provide some opportunity for visitors to develop science literacy skills (i.e., through presentation of health education content and the effect of decisions related to personal health habits). However, many visitors left the exhibition wanting to know more about the process of plastination and about the scientist responsible for the display. Here, the exhibition missed an opportunity to teach about the nature of science, and interestingly visitors felt this gap and were curious to learn more. Curators are encouraged to critically examine exhibitions to determine how scientific literacy can be enhanced.

Further insight into the changing role of the science centre emerged as visitors discussed the fusion of art and science within this *Body Worlds* display. It is suggested that the combination of art and science in the science centre may lead to a new form of engagement. The success of *Body Worlds* is one case whereby visitors recognized the art and science located within the display and responded positively. Visitor meaning-making was highly personal and often times emotionally laden, suggesting that the artistic element adds a new dimension to science exhibitions. Moore (2001) suggests that if science is presented “...artistically and imaginatively, as well as objectively and precisely... [visitors] will develop a more complete understanding of what science and scientists are about—one that is likely to capture their imaginations, emotions, and best efforts” (p. 1259). The case of *Body Worlds* supports an interdisciplinary approach to the presentation of science.

Of note is that the science centre did attempt to draw a wider audience of visitors by converting the traditional *Body Worlds* display into an artists’ sketch night. In continuing with this pursuit there may be value in expanding the marketing and
recruitment of participants to Body Worlds through other methods. As the museum moves into the 21st century, interdisciplinary approaches to exhibition design may serve to create more accessible displays, offering a wider target audience the opportunity to connect with them, and ultimately make meaning.

**Implications for Curators**

This case study of Body Worlds & The Story of the Heart has implications for museum curators and design staff as they attempt to create meaningful scientific exhibitions for the public. Visitors to this particular exhibition made very personalized meaning, demonstrating the importance of Falk and Dierking’s (2000) personal context while the physical and sociocultural contexts were seen to play a more supportive and enriching role in meaning made. Interviewees shared their deeply personal and highly unique stories showcasing the influence of social and cultural factors as well as prior knowledge and identity on visitor meaning-making in the museum. The diversity of meanings that emerged from Body Worlds supports Hooper-Greenhill’s (1999) view that a differentiated audience attends the museum – responses are specific to individuals, and yet patterns emerge among segmented groups – in this case identity-related occupational groups. Museum curators are challenged to consider prior experiences and identities of visitor groups attending the exhibition so as to provide them with optimal opportunities to forge personal connections and ultimately make meaning.

The case of Body Worlds demonstrates that controversial issues within a scientific exhibition have a place within science centres. In this specific case, visitors were at times confronted with objects that were at odds with their ethical, moral, or religious beliefs. In these instances, a critical approach to appraising the exhibition was made potentially
contributing to the development of scientific literacy for visitors. Visitors identified the presentation of western cultural norms within the display that were at odds with their cultural values. Curators are therefore encouraged to pilot exhibitions so that potential biases may emerge and be addressed. Curators are cautioned to explore their own preconceived notions and underlying social commentaries that may be found within their exhibitions. By gaining input from the public through pilot programs, curators have the opportunity to ensure their exhibitions do not perpetuate stereotypes or biases.

Museum curators are also encouraged to present contemporary issues to the public and offer them opportunities to reflect and debate their views. Visitors in this particular study described the importance of dialogue among their social group or with a docent. When designing exhibitions, curators are encouraged to provide opportunities for visitors to express their ideas in a safe, non-threatening way. This may be achieved by offering comment books for visitors to share their views, docents throughout the exhibition to speak with, posing thought-provoking questions throughout the exhibition to encourage dialogue among social groups, or following the exhibition with the option of attending a focus group. The majority of interviewees in this case openly shared their experiences and ideas with interviewers for 10 – 90 minutes demonstrating how talk following an exhibition may serve as an extension of the exhibition itself.

*Body Worlds* is a case that successfully engaged visitors in a controversial scientific exhibition; however, some visitors were left wanting more. Some visitors identified key elements that would have made *Body Worlds* more effective such as guides to provide tours of the display or having a travelling exhibition to visit classrooms. Some also described wanting a more interactive and multimodal display, as well as further
information about the plastinates themselves. While this static and quiet display has been overwhelmingly popular, interviewees and comments in this study identified room for improvement. Of particular importance was how visitors expressed wanting more information about the process of plastination and the scientist behind plastination. Here, some visitors identified a missed opportunity of the exhibition to teach about the nature of science. Future *Body Worlds* exhibitions would benefit from becoming more transparent so that visitors can fully understand the process and decision making involved in the creation of *Body Worlds*. Visitors more fully informed about the nature of the exhibition will be able to have their curiosity satisfied and may be able to form more educated opinions about the display. Curators are encouraged to consider creating opportunities for visitors to learn about the nature of science so that in addition to ‘learning’ and ‘doing’ science, they may also ‘learn about’ science (Hodson, 1998; Kolsto, 2001) thereby embracing and reflecting a broader vision of what it means to be scientifically literate.

Finally, as the science centre moves more fully into the 21st century, it appears that the conception of it as being a place of credibility, for hands-on interactive displays, and as a place for families with children will continue to be maintained. What may change is the nature of exhibition design itself. Scientific displays have evolved from presenting phenomena using objects, to hands-on interactive displays, and more recently to issues-based exhibitions. *Body Worlds* is a specific case that appears to have merged all three, albeit not in equal proportions. With over 34 million visitors to date, there is something to be said about the nature of this display. Visitors to this exhibition have recognized and responded positively to the integration of art and science in this display.
Curators are encouraged to find balance in display methods and consider using an interdisciplinary approach to exhibition design. In this way, curators may serve to create more accessible displays, offering a wider target audience the opportunity to connect with exhibits, and ultimately make meaning.
Chapter 8
Museum Practices, Cross-Disciplinarity and Representation

In this section, I step back and look at how *Body Worlds* presents a unique exhibition for the visitor because of boundary crossings that occurred at the level of exhibition set up, design and representation.

**Objects and Hands-On Exhibits**

*Body Worlds* is an exhibition that harkens back to the traditional curiosity cabinet display of the 16th century, where objects on display in glass cabinets were meant to be gazed upon rather than manipulated (Pitman, 1999). Unlike contemporary science centre displays, where objects are usually made to be handled by visitors in order to demonstrate a scientific phenomenon, *Body Worlds* relies heavily on static objects to tell their own stories. Simultaneously however, *Body Worlds* employs some use of interactivity as it presents issues related to health and the medium itself. While the two modes of representation (objects vs hands-on) are not found in balance within the display, both are utilized suggesting that historical and contemporary presentations of science can merge together to create a rich experience for visitors.

As museums enter an era where they are in direct competition with the technology that bombards the public, they must find ways to continue to draw patrons to their institution. Merritt (2008) has identified how exhibition designers are integrating technology into their exhibits and even digitizing entire exhibitions. *Body Worlds*, even though presenting static objects, was able to do so only through the use of innovative technology – plastination, which allows corpses to become plastic. In addition, some digital media was available for viewers while in *Body Worlds*. Merritt (2008) describes
how “museums play a more critical role than ever as purveyors of the authentic, addressing a human desire for the real as the wonders of technology march us towards the opposite path.” The millions of visitors that continue to flock to *Body Worlds* demonstrates a desire to engage with the real and tangible, especially with something as intangible as death. However, it is important to note that this static and quiet exhibition was the result of innovative technology. Marriage between groundbreaking technologies and traditional science display can serve to create novel forms of engagement for viewers.

As a teacher, I have witnessed approaches to teaching come and go. Over time, ultimately a balanced approach has proven to be best practice (Spiegel, 1998). I believe that the same can be said for scientific exhibitions. The results in this study demonstrated that *Body Worlds* included elements of all four generations of museums, that both static and dynamic objects do have a place in the representation of science. Rather than leaning toward one approach, a balance is effective as indicated through visitor interviews, observations, and comment book analysis. In this particular case, even though a small number of visitors described how the exhibition could be enhanced with hands-on and digital media opportunities normally found in science centres, the overwhelming majority of visitors were not opposed to the static objects. In fact many commented on the appreciation to view and contemplate objects before them.

The merging of historical museum display with current science centre hands-on techniques has a place in present day science centres. *Body Worlds* reverted to the more traditional curiosity cabinet display and enriched the experience with one table where visitors could hold three organs. This left some visitors wanting more of an opportunity to
hold or touch objects, or even to explore working models of joint systems. Even though this was the case, many visitors appreciated being able to view the dead and the science located within. The personalized meaning that emerged through the process of transposition on the static objects had visitors personally connecting with the objects. Cameron (1971) describes museum reform to require visitors to view the relevance of displays to their own lives, and Body Worlds has successfully accomplished this with a static and quiet display. While Watermeyer (2012) describes how conventional forms of display are “off-putting” (p. 2) for visitors, this study demonstrated that if visitors can connect with the exhibits the traditional approach is potentially effective.

Data in this study suggested that visitors connected with the human objects in glass cases on display, and yet appreciated the interactivity that came with manipulating organs. While science centres are places for hands-on interactive displays, the Body Worlds case suggests that there too may be a place for a more traditional approach to museum display.

Broadening the Science Centre Mandate

Exhibitions have been classified into three types: experiential, pedagogical and more recently critical (Pedretti, 2004; Wellington, 1998). Experiential exhibitions offer visitors the opportunity to engage in hands-on activity with a phenomenon, while pedagogical exhibitions specifically set out to teach something (Wellington, 1998). Critical exhibitions are identified by Pedretti (2004) as those that evoke critical thought by presenting issues-based subjects (which are often controversial) that invite visitors to consider multiple perspectives and are often emotionally and politically charged. Body Worlds can find all three classifications located within its display. First, experiential
opportunities are found in instances where visitors can handle human organs.  

*Pedagogical* opportunities are found within placards, short animations, and the chance to speak with scientists throughout the exhibition to gain further information. *Critical* aspects are incorporated as visitors are confronted with issues related to health and the use of cadavers as a medium to educate the public on human health.

As society moves into the 21st century, a fundamental shift in science education is occurring both in school and non-school settings. School science curriculum recognizes the importance of understanding content, doing or engaging in science, and attending to wider connections between science, technology, society, and the environment (STSE) (See for example Alberta Ministry of Education (2009) and Ontario Ministry of Education (2007) Curriculum in Canada). In other words, science educators are embracing a broader view of scientific literacy, that includes learning science (acquiring conceptual understanding), doing science (engaging in the process of inquiry and problem solving), and learning about science (developing an understanding of the nature of science and interactions among science, technology, society, and the environment) (Hodson, 1998). Similarly science centre mission statements (Fifth Science Centre World Congress, 2008) are adopting a broader view of what it means to educate the public in science and include experiential, pedagogical and critical exhibitions.

*Body Worlds* demonstrates that all three types of exhibitions experiential, pedagogical, and critical (although present to varying degrees) may be used to engage viewers and help to broadly support the development of scientific literacy skills. For example, data in this study suggested that the presentation of health-related issues in this display had visitors reflecting critically on their lifestyle practices and demonstrating an
awareness of the necessity to make healthier choices. Simultaneously, visitors were able to explicitly describe factual scientific information they gleaned from the exhibition. Learning about science was less developed in this exhibition, and visitors picked up on this. Some left the exhibition wanting to know more about the process behind exhibition design and the designer himself, demonstrating a missed opportunity to teach about the nature of science.

Science centres are able to support the development of scientific literacy through the creation of exhibitions that make use of both traditional and contemporary display practices to engage visitors in learning science, doing science, and learning about science. *Body Worlds* demonstrated how a controversial medium of static and dynamic objects embedded within the issue of health education can promote reflexivity for its patrons. A balanced approach incorporating pedagogical, experiential and critical exhibition strategies to scientific display may offer visitors the opportunity to engage in the balance of skills required of a scientific literate person.

**Merging Art and Science**

*Body Worlds* is a sight to see. It has been called both a spectacle of the dead and a beautiful display of art (Moore & Brown, 2007). Visitors in this study reacted positively to and engaged with this display that merged art and science. Rosenbauer (1958) commented on the role of art communication:

> Our curiosity, wonder, and delight are the driving forces that keep us constantly seeking knowledge. We should realize that the particular facts we acquire are only important because they fit into and enlarge a total concept. It is awareness of life, not just facts of life, that we must provide. It is essentially a problem of
communication. We must first be sure of what we want to say, then find a communicative device that will do what we want. The device will be found to be closer to art than to language (p. 9).

Rosenbauer’s assertion of art as a communication tool may be applied to von Hagens’ display of the human body. Many visitors to the Body Worlds exhibition noticed the art embedded within the display and did not take issue with this. Instead, visitors in this study left the display with feelings of awe and wonder of the human body. In this particular case, art and science merged to produce an exhibition with the potential to spark many personal connections for people.

Moore (2001) described the differences inherent in art and science; art is a single person’s viewpoint while science necessitates consensus among many people in the field. In his view, art involves an emotional quality, while science is often portrayed objectively and “does not express the imagination and joy of discovery inherent in its practice” (Moore, 2001, p. 1259). Art is open to interpretation, while science is capable of defining and describing the process of interpretation. In other words experiencing art may be a subjective experience whereby the viewer’s prior knowledge and cultural lens may affect its interpretation. The case of Body Worlds demonstrates how a scientific display successfully overcomes the divergence of art and science described by Moore (2001). It is at once the vision of one man, presenting a universally studied object – the human body. Von Hagens’ has successfully brought to light an opportunity for visitors to learn about the human body in a way that becomes personally accessible for the viewer through art. The artistic component (open to interpretation) included within this display, I argue,
is one component that allows for visitors to connect with the display in extremely personal and emotional ways, deepening the meaning made of the scientific display.

This display provoked for many visitors profound emotion which is unusual for a science exhibition. Visitor narratives in response to viewing the exhibits were often emotionally charged, which is not unusual for an issues-based exhibition (Pedretti, 2004). The topic of the human body and health has to some degree affected every human being on the planet, and this artful representation of the human body as dynamic sculptures – colourful, void of smell and fluids, may have enhanced the ability of the visitor to connect with the display.

The Body Worlds exhibition supports the idea that if science is presented “...artistically and imaginatively, as well as objectively and precisely, students[/visitors] will develop a more complete understanding of what science and scientists are about - one that is likely to capture their imaginations, emotions, and best efforts” (Moore, 2001, p. 1259). The positive reaction of visitors to the Body Worlds display suggests that meaning made of a scientific display can be enhanced and deepened through the use of art. Museum curators are thus encouraged to optimize the opportunity for visitors to connect with exhibits through the integration of the arts into their displays.

Merging Spirituality and Science

Body Worlds is a different type of exhibition that engages the public in spiritual and emotional ways. As Pedretti (2012) notes, the medium is the message. The cadavers on display bring visitors that much closer to death, something that remains a mystery for humans until the day that they die. A limited number of interviewees in this study indicated that they attended Body Worlds in search of spiritual answers to their questions
regarding the soul, however, they left with disappointment that their questions were left unanswered. Many other visitors marveled at the complexity of the human body and were left with feelings of awe and reverence. In addition, visitors left comments in books describing how the display either corroborated their belief in God or in evolution. What became apparent was that this exhibition of science brought spirituality and/or religion to the forefront of many visitors’ minds. Science cannot and should not be able to answer all questions that exist (McComas, 2004) especially with respect to religion or faith, and this is an important component of teaching about the nature of science. This science exhibition utilized quotations on the wall and its creative use of the medium to bring a spiritual component to physical objects, demonstrating that faith/spirituality can co-exist, and be positively received, within a science display.

Once again, the crossing of boundaries between spirituality with scientific display was positively embraced by the viewers of Body Worlds. Responses to the display were emotional which, I argue, served to deepen the meaning made of the display. Damasio (1994) writes about how emotion and cognition cannot be separated. He sees all learning, no matter how logical to involve emotion, and emotions to always involve cognition. Studies have shown that memory formation is strongly associated with physical context and emotion (Aggleton, 1992; Calvin, 1997; Hilts, 1995; Rose, 1993). The Body Worlds exhibition includes an ethereal component in its physical display, leading many visitors to experience a science display in an emotional and spiritual way. Visitor responses to the display were overwhelmingly positive, suggesting the effectiveness of merging the physical with the spiritual.
Integrating Science and Entertainment

In the mid-nineteenth century museums were typically public galleries (e.g., part of a library, historical society, university etc.) or dime museums (i.e., commercially driven with entertainment as its primary function) (Pitman, 1999). Phineas Barnum significantly influenced dime museums using peculiar living and dead objects to interest, shock, and entertain the public (Pitman, 1999). Pitman (1999) notes that dime museums, “associated with showmanship, theatricality, and publicity, are redolent in some respects of the ‘blockbuster’ shows of today” (p. 5). Body Worlds is an exhibition that incorporates properties of both the public gallery and dime museum as it seeks to educate the public on human health, while simultaneously striving to shock and entertain.

Body Worlds is a modern day blockbuster exhibition due to its continued success which may be attributed to its entertainment qualities i.e., the pushing of boundaries as von Hagens’ continues to create more thought-provoking and creative plastinates. Humans are naturally curious, and this exhibition provides opportunities for visitors to closely observe cadavers – a practice normally reserved for medical school. Future studies with Body Worlds could explore what precisely visitors find so fascinating. Is it the scientific content or how von Hagens’ continues to push the boundaries of display? I suggest it is both which supports the view the museum visitors are looking for a combination of education and entertainment i.e., “edutainment.”

When visitors in this study were questioned about their reasons for visiting the exhibition, the majority of responses fell within Falk’s (2009) identity-related motivation categories of: explorers, facilitators, professional/hobbyist, experience seekers and spiritual pilgrims. I argue that all categories (with the exception of spiritual pilgrim) in
some way involve the desire, with varying degrees, to seek an entertaining or social experience in order to engage with science. (The spiritual pilgrim in this study explicitly described attending the exhibition in order to connect with the soul and not for a scientific learning or entertaining experience.) As humans seek leisure experiences in informal learning spaces, a degree of desire for entertainment likely exists as they hope to engage with the subject matter.

While commercial industries view entertainment and education as opposing ends of a continuum i.e., the more education involved the less entertainment and vice versa, museum industry does not hold this view (Friedman, 1997). Museums recognize the ability of entertainment and education to exist simultaneously and *Body Worlds* is an example of how entertainment and science content have merged to produce one of the most successful science exhibitions of its time.

Entertainment has the ability to delight, inspire, engage, and sustain interest for people. From the data collected in this study, the non-traditional representation of human biology was well received by those who attended and effective as visitors connected a current event with prior knowledge or experiences. Von Hagens’ has demonstrated the success of merging entertainment with informational content. And while plastination showcases the advanced technology that exists to display the human body, the desire to shock, amaze, and surprise is an approach used in the mid-1800s. *Body Worlds* reminds the museum world of the importance of human curiosity and desire to be engaged. Edutainment is indeed an effective method that drives visitors to enter the museum and when done right, can promote meaning-making for its visitors.
Accepting Science and Questioning Science

Science is often portrayed as authoritative, powerful and holding absolute truths (Hodson, 1998). Museums are inherently powerful, and as such this power is transferred to the objects on display within them (Cameron, 1971). That is, objects displayed within a museum have been deemed worthy of display and important to view. In this sense, displaying von Hagens’ plastinates in the science centre affords them power that implies the objects are of value and worth seeing. Visitors in this study identified how the science centre was the only sub-set of museums that would afford credibility to the display of Body Worlds, and yet simultaneously questioned the messages that were delivered by this display.

Foucault (2003) describes how power relations are present and integral to the functioning of society: “A society without power relations can only be an abstraction” (p. 140), however this does not imply that all power relations are necessary or good. The museum is not neutral; it delivers messages and makes arguments (Starn, 2005). Messages located within displays may lead to empowering some visitors while simultaneously demoralizing others. In this particular case, the data suggests that Body Worlds & The Story of the Heart, may be classified as a heterotopia (Foucault, 1967) – a place that mirrors western cultural norms and stereotypes. What was interesting in this study was that visitors simultaneously accepted and supported contemporary views of science centres and science as authoritative and credible, and yet questioned underlying messages located within this scientific display that were at odds with their cultural values. Visitors voiced their displeasure with messages located within the display that reinforced Western stereotypes regarding gender roles, body image and sexuality. In this particular
instance, praise must be given to visitors as they questioned a display which was located within a space that they described afforded credibility to the display.

This acceptance of science as authoritative, while at the same time questioning the messages resulting from this science display, demonstrates a visiting public that is reflexive in its thinking. Visitors to *Body Worlds* did not unquestioningly accept the messages being dispelled by the display even though it was deemed to be a scientific display held in a space that offered it immense credibility (as opposed to an art gallery which to some, in their view would undermine the display). Instead, it would appear that many visitors had some understanding of the nature of science – that it is a human endeavor, with a subjective element that may be influenced by historical, social, and cultural factors (McComas, 2004).

Bennett (1995) describes the importance of examining links between exhibition design and consumption: “This is to suggest that, in addition to what gets shown in museums, attention needs also to be paid to the process of showing, who takes part in those processes and their consequences for the relations they establish between the museum and the visitor” (p. 103). Since exhibition design always involve cultural, social, political and ethical considerations, curators must become transparent in the process that led to their final design (Macdonald, 1998). Part of this process involves offering visitors the opportunity to preview exhibitions and provide feedback to curators (Cooks, 1999). As museums strive to prepare exhibits of contemporary relevance with intent of becoming agents of social inclusion (Conn, 2010; Sandell, 2000), the participation of visitor thought and opinion at the design stage of exhibitions will help to more authentically support this goal.
This study suggests that exhibitions are never just “representations of uncontestable facts” (MacDonald, 1998, p. 1) but rather hold powerful messages that are often controversial and complex. Much more attention needs to be given, by museums, to the unintended messages that are communicated through their displays; especially when they are located within a science centre that is considered to be powerful, holding absolute truths.

Through this investigation of Body Worlds, I have come to understand that science exhibitions can provoke deeply personal and meaningful connections for visitors. Data from this study suggest these connections are attributed to several factors involving the use of a multidisciplinary approach to representing science. Specifically, the Body Worlds & The Story of the Heart exhibition at the Ontario Science Centre blended historical with contemporary museum practices, and utilized cross-disciplinarity to create representations of science as active site for meaning-making that connected visitors’ past experiences and knowledge to a present encounter. What emerged from this study was strong support for Body Worlds as an exhibition that promoted meaning-making suggesting a revised conception of science exhibitions as multidimensional and interconnected sites that cross disciplines and merge historical museum practices with contemporary (or some might say controversial) practices.

My findings suggest that Body Worlds transcends boundaries at the level of exhibition design and scientific representation which may explain why this exhibition has been one of the most successful traveling science exhibitions in the world. This interdisciplinarity across museum practices and disciplines was seen in multiple ways
including: (a) including objects and hands-on exhibits, (b) broadening the science centre mandate, (c) merging art and science, (d) merging spirituality and science, (e) integrating science and entertainment, and (f) accepting science and questioning science. When balance and blending of the above factors occur an innovative form of engagement results, providing visitors the opportunity to make deeply personalized meaning of scientific displays.

This research study supports the idea that visitor accessibility of science exhibitions may be enhanced when technology, the arts, spirituality, edutainment, issues and a combination of historical and contemporary museum practices are used to present science. Offering a variety of entry points to access science exhibitions enhances the number of ways that visitors may personally connect and make meaning of a science exhibition, particularly those that are controversial in nature. Although Body Worlds began as an exhibition confronted with much public criticism, vehemently protested as it travelled from one country to the next, today visitors to Body Worlds share a range of passionate responses from disgust and rejection, to awe, fascination, and even inspiration. The wide range of responses demonstrates that a controversial science exhibition, blending and crossing boundaries across disciplines and museums practices, has the ability to provoke a variety of personal responses from visitors.
References


Appendix A: Interview Protocol

Background information:
- Introduce yourself
- Explain the premise of the study - interested in visitors’ responses to the *Body Worlds* exhibition
- Ask visitors if they would mind being interviewed (15-20 minutes)
- Ask if they would mind being recorded, assure them anonymity and explain that they do not have to answer all questions, interview can stop at any time, verbal consent, in an education context
- Can interview couples/small groups
- Want a good cross section (demographic)...keep a tally of how many from each age group in journals (general cross section)

Some general demographic detail:
[ ] male
[ ] female

2. Age range:
[ ] 20 – 29 [ ] 30 – 39 [ ] 40 – 49 [ ] 50 – 59 [ ] 60 – 69 [ ] > 70

3. Can you share your occupation?

4. Did you come alone or with others? Who?

5. Why did you choose to visit the *Body Worlds and the Story of the Heart* exhibition?

6. What did you expect to see/experience/observe at the exhibit? Why did you decide to attend today?

7. What did you find most interesting and why? (can you refer to a specific part of the exhibition?)

8. Please describe any emotions that the exhibit evoked in you.

8. Did anything about the exhibit disturb you? Please explain. (If the answer is no, ask, Why do you think others might find this exhibition disturbing?)


10. What do you think is the purpose of this exhibition?

11. What messages are you taking away from this exhibit?
12. Will these messages affect your future behaviours/actions? How?

13. If with others, what were some of the things that you spoke about with your partner? If alone, did you want to phone or text someone to discuss?

14. Do you think that this is an appropriate exhibition for a Science Centre? Why or why not?