In 1994 the Institute for Learning Innovation hosted a National Science Foundation-funded conference in Annapolis, MD, to discuss the creation of a research agenda that would investigate the long-term impact of experiences in museums and science centres. As a warm-up exercise on the first day, participants were invited to share a memorable museum experience of their own. Most participants represented science museums, science centres, aquariums and zoos but despite the preponderance of science museum professionals, the memorable experiences that participants described were not about learning some fascinating factoid of science. Instead, the experiences shared often included a close interaction with an object or idea of personal significance to the participant that was described in a rich and emotional way (I can still remember the vivid description of one person, very interested in the history of astronomy. He described a moment of epiphany gazing at an ancient mariner’s sexton displayed at the Greenwich Museum in Greenwich, England with such emotion that it brought tears to my eyes).

Although this activity was designed as a warm-up, a way to begin the conference discussion, it became a focal point of the meeting, a conversation that was returned to throughout the meeting, as the group struggled to craft recommendations for a long-term research agenda to document learning in and from museums. I think the group returned to these powerful and moving stories, not because of their details, but because there were some central truths about learning contained within them. For me personally, it was a defining moment, an experience that I have found myself continuing to think about over the last decade and which has shaped my research and ideas significantly. The individual stories shared encapsulate for me both the wonder and challenge of understanding and documenting science learning, certainly in the arena of museums and science centres, but in other settings as well.

Recent and emerging research about the nature of learning, encapsulated well in Mike Watts’ chapter and others in this book, suggests that learning is always highly personal, multi-faceted and strongly influenced by setting and emotion. However, as so many of the chapters in this book also attest, demonstrating the role that affect plays in the learning of science, particularly in classrooms, is difficult and time consuming; such investigations are rare and still in their infancy (fortunately this book gathers a number of them together in a very comprehensive and accessible manner).

However, there is another perspective. Is it possible that the investigation of science learning in the free-choice learning arenas of museums, science centres, zoos, aquariums, the Internet and the family are actually better settings in which to explore relationships between affect and cognition? I think so, which is why I have been drawn to these settings as places to investigate learning, particularly learning guided by the needs, interests and motivations of learners themselves.
believe that the unique qualities of these settings, including their interdisciplinary and multi-
sensory presentation of people, events, ideas and objects, their ability to not only accommodate
but encourage and sometimes even require social interaction and the opportunities afforded for
choice and control by the learner, allow a researcher a window with a different, but
complementary and perhaps even better view for investigating the role that affect plays in
facilitating science learning.

In this chapter I plan to expand upon these ideas, by building a case for this argument and sharing
some of the empirical studies that colleagues and I have conducted in this area. I have three
goals: 1) To briefly describe the role that affect plays in learning, utilizing evidence emerging
from new brain research; 2) To discuss the important role which affect plays in science learning in
and from museums; and, 3) To share some of the studies which have attempted to demonstrate the
role of affect in such learning. Finally I will suggest the need for a more integrated understanding
of emotion and cognition across all aspects of the science learning infrastructure (schools,
universities, museums, science centres, etc.).

**Affect & Learning**

“When she got to the river’s edge, she found that a large boat was traveling down the river and
the lift bridge was up. She waited while the boat passed and the bridge came down. While
waiting she watched the mechanism of the bridge, and realized excitedly that she understood the
way that the counterweights and gears were making the huge mass of iron, steel, and roadway go
up and down so easily. She also realized that she had a whole vocabulary to describe this that she
didn’t realize she knew. Then she recalled that she had learned all this from an exhibit on bridges
at the Cleveland Children’s Museum which she had visited the year before with her young
grandson.”

This brief but intriguing description shared by a visitor illustrates the “view from a different
window.” This woman had not participated in a formal physics course in which bridges were
discussed nor were there plans for a test at the end of her experience. Although well educated,
serving as an Assistant Professor of Speech & Hearing at a university, her areas of interest are
language and reading development, not science. She even describes herself as a science novice.
However, she was able to richly describe how counterweights and gears act together to move a
huge mass of iron, steel, and roadway up and down easily, using technical vocabulary that she did
not realize she knew. How is this possible?

This woman’s experience at the bridge demonstrates three important concepts central to the
nature of the learning process and accommodated well in free-choice settings: Learning is
strongly influenced by 1) emotional and other affective factors; 2) motivation; and, 3) closely
related to the previous two principles; learning is facilitated by personal interest. In addition,
“new” knowledge is constructed from a foundation of prior experience and knowledge and is
expressed within appropriate contexts.
**Emotional & Other Affective Factors** Most human learning is self-motivated, emotionally satisfying and very personally rewarding. Humans learn when they are in supporting environments, when meaningful activities are engaged in, when they are freed from anxiety, fear and other negative mental states, when individuals have choice and control over their learning, and when the challenges of the task meet the person’s skills (Deci et al. 1981; Deci 1992; McCombs, 1991; Maehr, 1984; Diener & Dweck, 1980; Pintrich & DeGroot, 1990; Covington, 1992; Paris & Cross, 1983; Paris, 1997; Csikzentmihalyi, 1990a, 1990b). Within this context, it is easy to imagine the woman described earlier readily learning about the role of gears and counterweights in the functioning of bridges as she plays with her grandchild at a children’s museum.

Learning as a process/product evolved long before there was language or mathematics, in fact, before there were humans, primates or other mammals at all. Learning is the process/product of a complex series of electro-chemical interactions in the brain and body, processes/products that have evolved over many hundreds of millions of years. It is profoundly important to appreciate the long evolutionary history of human learning; learning is not just a recent cultural overlay unique to “modern humans.”

A very important, and relatively unappreciated by-product of this long evolutionary history, are the feedback loops that exist between emotional and cognitive processes. In large part these feedback loops are mediated by one of the oldest parts of the brain, the area known as the limbic system. Located in the middle of the brain and made up of a number of discrete structures (for example, the amygdala, hippocampus and thalamus), early on the limbic system was recognized as the major centre in the brain for emotional and geographical memory (Sylwester, 1995; Calvin, 1997). The limbic system structures have been found to be extensively connected in looped circuits to all parts of the brain, as well as to all of the body's organs and systems, responding to the needs and demands of various body functions and cycles. The limbic system not only helps regulate emotions and geography; it has emerged as the focal point for regulating all memory, thus learning (Rose, 1993; Sylwester, 1995; Hilts, 1995; Calvin, 1997).

All incoming sensory information is given an initial screening for meaningfulness and personal relevance by structures in the limbic system. This process both determines what is worth attending to and remembering and how something is remembered. Research in the last quarter century has shown that learning can not be separated in the Cartesian sense between rational thought and emotion, nor neatly divided into cognitive (facts and concepts), affective (feelings, attitudes and emotions) and psychomotor (skills and behaviors) functions as many psychologists and educators have attempted to do for nearly a half century (Rose, 1993; Sylwester, 1995). All learning, even of the most logical topic, involves emotion, just as emotions virtually always involve cognition (Damasio, 1994; Piaget, 1981).

Thus by virtue of its journey through the limbic system, every memory comes with an emotional "stamp" attached to it (Damasio, 1994). The stronger the emotional “value,” the more likely sensory information is to pass this initial inspection and be admitted into memory; and interestingly, pleasant experiences are strongly favored over unpleasant ones (Sylwester, 1995; Damasio, 1994). Evolution has thus insured a dependency between learning and survival by...
making the process of acquiring and storing information both very thorough and, for the most part by virtue of its relationship to the limbic system, more often than not an intrinsically pleasurable and rewarding experience (Csikzentmihalyi, & Hermanson, 1995). As theorized by neuroscientist Gerald Edelman, learning is a whole body experience, involving the emotions, the senses, the physical as well as the mental (Rosenfield, 1990). Sigmund Freud appreciated this fact over a hundred years ago when he observed that memories unattended by emotion were unrecognizable (Freud, 1959). One place where this connection is seen powerfully is in the well-designed free-choice learning setting, multi-sensory settings which facilitate whole body learning experiences effectively.

**Motivation** There is another key idea about learning that is central to this thesis. Almost 50 years ago, psychologists realized that a basic dichotomy existed in learning; people either learned when they felt they wanted to or they learned because they felt they had to (Harlow, 1954). The outcomes of learning, it seemed, differed significantly depending upon which of these two conditions, or *motivations*, existed. The terms used to distinguish between these two types of motivation were *intrinsic* versus *extrinsic* motivation (Csikzentmihalyi and Nakamura, 1989).

Action is extrinsically motivated when the anticipated benefits are external to the activity. By contrast, intrinsic motivation means that the performance of an action is done for its own sake, even in the absence of some external reward. Adult participation in evening arts and crafts, exercise and relaxation classes, visiting a museum or theater while on vacation, and playing sports and games after school are examples of intrinsically motivated activities (deCharms, 1992; Deci & Ryan 1985; White, 1959).

The affect and behaviors observed in museums and other engaging free-choice settings closely resemble the descriptions of learning recorded by psychologists investigating intrinsically motivated learning. Originally studied and described by psychologist Mihaly Csikzentmihalyi, and confirmed by a wide range of other investigators, people appear to exhibit a common set of behaviors and outcomes when engaged in free-choice tasks for which extrinsic rewards are absent (Csikzentmihalyi & Hermanson, 1995; Clifford, 1991; Schunk, 1989). Chess players, rock climbers, dancers, painters and musicians use similar explanations when describing the attraction of the activities they enjoy doing. They stress the fact that what keeps them involved in these demanding activities is an inherent quality, something Csikzentmihalyi calls the *flow experience*, because it is generally described as a state of mind that is spontaneous, almost automatic, like the flow of a strong current (Csikzentmihalyi & Hermanson, 1995).

A general characteristic of intrinsically motivated activities that produce flow is that they have clear goals and appropriate rules. Flow activities also usually provide immediate and unambiguous feedback and according to Csikzentmihalyi, this constant accountability is a major reason one gets so completely immersed in a flow activity. Another universally mentioned characteristic of flow experiences is that they tend to occur when the opportunities for action in a situation are in balance with the person’s abilities. If the challenges are greater than the skill levels, anxiety results; if skills are greater than challenges, the result is boredom (Rohrkepmper & Corno, 1988; Csikzentmihalyi & Hermanson, 1995). This phenomenon appears to hold across a wide array of skills; including physical, mental, artistic and musical talents.
Successful museum exhibitions, performances, films, television programs and web sites share these qualities as well as one other fundamental component of motivation, the element of control (Paris, 1997). In free-choice learning situations, the learner can self-select the challenge they wish, rather than have it imposed upon them. In a museum this is evidenced by the high degree of self-selection that visitors exercise over which exhibits to view and/or utilize. No visitor views/utilizes all exhibits in a museum, but virtually every visitor views/utilizes some (Falk & Dierking, 1992). Generally, the ones selected are ones that interest the visitor, as well as provide appropriate levels of intellectual, physical and emotional challenge.

Interest
Many psychologists, and educators, treat motivation as a vague, everyday term, of which interest is a component. Psychologist Ulrich Schiefele has pointed out that motivation, in general, and interest, in particular, are complex, multi-dimensional states; even the construct of intrinsic motivation described above is usually subject or topic specific, rather than a generalized quality (Schiefele, 1991). Thus, when I use the term interest I am not merely referring to what someone likes or dislikes. Rather, I refer to a psychological construct that includes attention, persistence in a task and continued curiosity, all factors important to an understanding of what might motivate someone to learn in a museum; to become fully engaged in a museum exhibition, program or event (Hidi, 1990; Dierking & Pollock, 1998).

People are bombarded with stimulation all the time. The human brain is designed to sift through this abundance of information to selectively determine what to attend to and what to ignore. One filter for this selection process is interest. If we had no interests, our senses would be deluged with information and total mental chaos would result. As pioneering psychologist William James stated more than a hundred years ago, “without selective interest, experience would be utter chaos.” (James, [1890]1950, p. 237).

What determines interests includes a range of variables, some of which are universal, some the result of individual experiences and others personal history. When people like something, they attribute positive feelings and values to it; the result is a high probability that they will choose to follow up on that interest with action (Pintrich & DeGroot, 1990). A wide range of investigators have remarked on the presence and influence of “interest” in the learning and behavior that occurs in free-choice learning settings like museums (Ramey-Gassert, Walberg & Walberg, 1994). Successful museum exhibitions, performances, films, television programs and web sites are excellent media in which visitors can pursue their own personal interests because there is sufficient breadth and depth to permit the learner to self-select the experience they wish to have, based on their prior knowledge, experience and interests.

Affect & Science Learning in and from Museums

One action that can, and for many people does flow from interest in science and technology, is the decision to attend a science museum and once inside to pay selective attention to specific exhibitions or exhibit elements. Such opportunities to pursue topics of personal interest and the learning that results as a consequence, can have important application to real life situations.
Museum professional Aubrey Tulley described an encounter with a young woman he met at a reception who ascribed great significance to her learning experience at the Science Museum in London (Tulley & Lucas, 1991). According to the woman, she had recently visited her sister who said that she was worried that her small children might leave the house unsupervised because the lock on the back door was broken. Upon hearing her sister’s concern, the young woman borrowed a screwdriver and mended the lock. A week before this incident, she had spent time assembling the lock and key exhibit at the Science Museum. She asserted that without having encountered the exhibit she would never have had the confidence to respond to her sister’s problem as she did. She described this as an emotional effect, on her “confidence,” but clearly it was an emotional, cognitive and psychomotor learning experience, a learning experience that was she could transfer to a new situation.

It is significant that both this learning and the learning about bridges described earlier occurred not from a book or lecture, but at a museum. Both people learned while doing, while playing with locks, gears and counterweights. And it is also significant that, at least in one case, the learning occurred while actively engaged in playing with a grandson. Successful science museum exhibitions, performances, films, programs and web sites share these common qualities, permitting the learner to seek the level of engagement and understanding appropriate for that person and tapping into personal and emotional entry points. A good exhibition, performance, or film can be understood at many different levels and from many different perspectives. Thus the learner is engaged in a variety of ways that make sense to them personally and can be challenged at a variety of different skill levels. Thus engagement, a flow experience, can result because there is sufficient depth to permit appropriate levels of challenge for a wide range of users.

Some Evidence

HIV/AIDS Traveling Exhibition
In the early 90s, with support from the U.S. Centers for Disease Control, a consortium of prominent American science museums developed a traveling exhibition on HIV/AIDS, *What About AIDS?*1 When the exhibition was being developed in the early 1990s, awareness and concern about the disease was very high. Although opinions differed widely on a number of HIV/AIDS-related issues, most Americans felt a strong need to learn more about the subject. Thus, although potentially controversial, at the time of its development it was clear that an exhibition on this topic was going to be widely perceived by the public as interesting and timely. Through front-end research (research designed to assess what people know about or are interested in knowing about a topic conducted at the beginning of the exhibition development process), it was also determined that most Americans possessed both a high degree of awareness about the HIV/AIDS epidemic and a reasonably high knowledge of basic “facts” related to HIV/AIDS. However, most Americans lacked detailed knowledge of the science underlying HIV/AIDS, for

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example, the nature of viruses and the workings of the human immune system, and most were totally unaware of the various permutations of prevention strategies.

A series of evaluation studies conducted by Dana Holland and John Falk revealed that, by all measures, this exhibition was a successful learning experience for most who visited it (Falk & Holland, 1993; Holland & Falk, 1994). Although not every visitor walked out of the exhibition knowing at least one, pre-determined specific new fact or concept about HIV/AIDS, the exhibition afforded every visitor the opportunity to connect to the topic and learn something that was personally relevant to them; the data suggested that this learning was highly variable and often very personal.

In-depth, open-ended interviews with people after they completed their visit to the *What About AIDS?* exhibition revealed how personally constructed and affectively influenced each visitors’ learning was. Although the specifics of what a person learned was sometimes hard to predict, the relationship of that learning to the individual was predictable. More often than not, a visit to the exhibition significantly strengthened a visitor’s prior understanding of the subject; only occasionally did they exit with a significantly new understanding. Very few of the visitors interviewed upon exiting *What About AIDS?* demonstrated evidence of a radically new view of the epidemic. However, what people learned was often expressed in strong emotional ways:

“They [in the exhibit] were talking about coming in contact with people who have AIDS and they were saying that you are more ... of a threat to them then they are to you. You know, because the virus, uh, something about how the viruses can’t be treated with antibiotics, but bacteria can. I saw that on one of the things, and I said, that’s very interesting because everyone is so scared of the person with AIDS, but the person with AIDS should be scared of you.”  (Female, teens)

“It made you aware, it made you really realize that it can happen to anybody, you know. And I think it also [explains], for people who don’t know it, the three main [ways] you can get it.”  (Male, 20s)

These changed perceptions also persisted over time. Follow-up data collected three months after seeing the exhibition indicated that two-thirds of the visitors claimed to have thought about the exhibition since their visit. Examples of what people said were:

“I found myself still thinking about some of the things in the exhibit even weeks later. For example, I hate to say it, but the dice exhibit [probability of getting AIDS interactive] really made me think about who I go out with these days.”  (Female, 20s)

“Just the other day, I saw this piece on TV about AIDS and I was able to understand what they were talking about, the immune system in all, because of that exhibit.”  (Male, 30s)

Findings from the *What About AIDS?* summative evaluation suggested that it had been a highly successful learning experience for visitors with a wide variety of backgrounds knowledge and
interest in the topic. Why? Researchers have recently argued that it would be difficult to design a more ideal setting for meaningful learning and meaning-making than a well-designed museum or science center (Falk and Dierking, 2000, 2002; Dierking, Luke & Buchner). Increasing evidence suggests that when exhibitions and programs are designed well, they are very successful at supporting free-choice learning and public understanding of science and technology. I believe there are three reasons for this success:

1) Each visitor can experience the ideas/phenomena presented on their own terms, freely choosing what to attend to and interact with depending on their prior knowledge, interest and experience;
2) The ideas/phenomena presented are very accessible because for the most part these institutions are safe, comfortable, fun, social environments; and,
3) The ideas/phenomena are embedded in rich real world contexts where visitors can see and directly experience the real world connections of these science and technology ideas/phenomena.

As described earlier, this exhibition was developed in the early 1990s, when most Americans had not only heard about HIV/AIDS, but were also deeply concerned and interested in the topic. Although opinions differed widely on a number of HIV/AIDS-related issues, still many, if not most Americans, felt a strong need to know more about the subject. As suggested, front-end evaluation had revealed that most Americans possessed both a high degree of awareness about the HIV/AIDS epidemic and a reasonably high knowledge of basic “facts” related to the disease, however, most Americans lacked detailed knowledge of the science underlying AIDS.

Using this information about potential visitors, it was possible to devise a strategy for how to present the topic of HIV/AIDS in an exhibition that would accommodate the interests and prior understanding of the vast majority of the public likely to encounter the exhibition. Since for a brief period most people shared a common interest, level of awareness and range of understanding; though not a common set of beliefs about this topic, a single exhibition had a reasonable chance of meeting the needs and interests of a diverse public by connecting what was familiar and known about HIV/AIDS to some of the new information exhibit developers hoped to convey. However, despite the rare confluence of general interest, awareness and knowledge afforded by the subject of HIV/AIDS in the early 1990s, the What About AIDS? exhibition would not have been successful if it had been designed in a linear fashion, with a single entry and exit point. Although the public shared a general interest, awareness and knowledge about HIV/AIDS, they did not share a specific interest, awareness and knowledge about the topic. In other words, although two individuals may have been generally interested in HIV/AIDS and had roughly comparable awareness and knowledge, individual A, who was married, monogamous and 67 years old might have been primarily interested in learning about how the epidemic might influence the health care system and the economy, while individual B, who was 19 years old and single, might have been primarily concerned with her chances of getting HIV/AIDS over the next few years.
A major design element of this exhibition was the incorporation of choice into the exhibition. Visitors could select between three general topics -- biology of HIV/AIDS, HIV/AIDS as epidemic and HIV/AIDS prevention -- and then could also select from a multitude of specific topics: what is a virus, how does the immune system work, and what are the relative advantages and disadvantages of different birth-control methods on HIV/AIDS prevention. There were also choices for different learning modalities; one could read, watch video, manipulate hands-on interactives, use computer programs, and/or listen to audiotapes. A visitor also could choose between a variety of different approaches to the topic of HIV/AIDS, for example, they could learn about it through presentations of scientific facts and concepts, they could examine epidemiological charts and graphs, there were tapes and photographs detailing firsthand accounts of individuals with HIV/AIDS and there were even opportunities for visitors to describe/share their own personal stories about HIV/AIDS. As a consequence, a wide range of visitors, each with their own diverse set of specific interests and knowledge, could select how and what they chose to learn about the topic.

The *What About AIDS?* exhibition also afforded very personal experiences. A family group could enter the exhibition, split up and each member utilize a separate part of the exhibition, occasionally coming together to share notes and suggest parts of the exhibition for others to see or they could interact together throughout the exhibition. And the findings of the summative evaluation supported the effectiveness of this aspect of the exhibition. Not only did visitors find the content exceedingly accessible in a number of ways, with information presented from a variety of different perspectives, and at a variety of different points within the exhibition, observation data collected during the summative evaluation of the exhibition revealed that visitors had taken advantage of the choices offered. The developers appreciated that visitors entered and exited the exhibition with differing learning agendas and purposes, and strove to accommodate these differences.

The emotional component of this exhibition was also important to its success. As suggested throughout this chapter, emotion is a vital aspect of learning and problem solving and, consequently, it is an important dimension of many successful learning experiences. The topic of HIV/AIDS is a topic strongly infused with emotion and controversy, an aspect of the exhibition that caused some administrators and Boards of Directors around the U.S great angst as the exhibition traveled. Although the emotional and controversial aspects of the exhibition may have been a political negative in some communities, these factors contributed to it being a very successful exhibition for personal learning. Being able to capitalize upon emotion is an important dimension of learning in free-choice settings such as museums and science centres. Fun, excitement, joy, mystery, sadness, surprise, pathos, anticipation and empathy are all emotional experiences that can and should be considered fundamental constituents of learning. Education and enjoyment are not opposite ends of a continuum, they are separate and complementary, and in the museum context they combine to become the museum experience. Arguably, the essence of this experience is choice in what and when to learn; personal control over the learning.

**Family Learning Initiative at The Children’s Museum, Indianapolis** A systemic research effort at The Children’s Museum (TCM) of Indianapolis, the Family Learning Initiative, provides
two additional examples of how affect influences and in some cases *is* the learning. One study was designed to document the nature and extent of family interaction and engagement within a science exhibition about biological, medical, and cultural aspects of bones (Luke, Wadman, Dierking, Cohen Jones & Falk, 2002). Data collection included tracking family interactions, conducting interviews, utilizing Personal Meaning Mapping, a constructivist methodology developed and refined at the Institute, and recording conversations. Findings revealed that the exhibition succeeded in facilitating science learning about bones and enhancing both children’s and adults’ thinking about the biological, medical, and cultural aspects of bones. Data from the interviews and conversations revealed that the exhibition gave families opportunities to spend time together, relate exhibit content to their own personal family history, and build a collective identity. The data were replete with instances of family members excitedly sharing stories of broken bones (prompted by x-rays in the medical section of the exhibition) or discussing what the family dog might look like without its fur (prompted by skeletal models of animals in the zoo section of the exhibition). Families shared information and personal stories, working together to make meaning from the exhibition. These experiences also extended beyond the museum as many families went home to look at “Dad’s x-rays” or to draw the dog without its fur.

In another Family Learning Initiative study, Luke, Dierking, Cohen Jones and Falk (2002) examined the long-term impact of two youth-based programs on young adults and their families, one focused on science exclusively, another a multi-disciplinary program. Findings demonstrated that these programs influenced participants’ attitudes, interests and awareness. However, interestingly, these findings were not only observed at the individual level. Data gathered within a social systems approach demonstrated that these programs influenced family dynamics, giving young adults the opportunity to explore new roles, perspectives and identities within the family and learn new things about family members. In some cases, interests that young adults developed within the program were carried over into the family context, influencing siblings and/or parents to pursue these same interests. Programs also influenced young adults’ contributions and connections to the larger socio-cultural community, fostering a tolerance of other people and cultures and cultivating a sense of civic responsibility, and helping youth to learn to participate successfully within a community of learners.

**Conclusions**

Earlier in this chapter I suggested that free-choice learning arenas such as museums, science centres, zoos, aquariums and the Internet are excellent settings, different windows so to say, in which to explore relationships between affect and cognition. It is hoped that this chapter has provided support for this thesis, demonstrating how the affective dimensions of learning are supported so well in these settings and consequently, how investigations there are able to tease out and focus on the affective dimensions of learning in ways that are difficult in other settings. I hope that these findings will encourage researchers to take a more integrated approach to the investigation of emotion and cognition, not just in schools but across all aspects of the science learning infrastructure (schools, universities, museums, science centres, etc.). We still have much to learn about how people connect the various science learning experiences in their lives: from
home, school and free-choice learning settings. Certainly the results shared in this chapter suggest that museums can foster not only the affective learning of the individual, but also learning at the family and community level. In a recent dissertation study of family learning in which families who were frequent visitors to science museums were observed in museums, at home, and in other leisure environments over the course of eighteen months, the in-depth data revealed the ways in which families over time used seemingly unrelated interactions in museums and at home, to develop their family identity, in the case of these families very centred on learning. Studying the families’ interactions across multiple learning environments provided a needed lens for understanding the complex motivations underlying the families’ practices in the museum (Ellenbogen, 2003). This could be a fruitful area of research, a new window to gaze through, which might elucidate even more how these experiences support and facilitate learning across the different aspects of peoples’ lives, across the lifespan.

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