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Diving to New Depths: An Exploration of Aquarium Visitors' Reflection at a Shark Exhibit

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DIVING TO NEW DEPTHS: AN EXPLORATION OF AQUARIUM VISITORS'
REFLECTION AT A SHARK EXHIBIT

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ABSTRACT

DIVING TO NEW DEPTHS: AN EXPLORATION OF AQUARIUM VISITORS'
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Zoos and aquariums (Z/As) are conservation-oriented free-choice learning institutions. In order

to support their mission of advancing wildlife conservation, Z/As deliberately design

opportunities and experiences to meaningfully engage visitors in understanding, caring for, and

acting on behalf of exhibited species. Conservation psychologists and practitioners have applied

values-based and models of human behavior to design and evaluate experiences aimed to

influence myriad cognitive, affective, and behavioral outcomes. However, there is little research

exploring the role of and opportunity for reflection within these institutions. Models of reflection

and reflective practice, which are rooted in both theory and empirical data, stress the importance

of reflection in achieving transformative learning outcomes. Furthermore, research within higher

education and workplace settings find that reflective interventions can be utilized to enhance

reflective abilities and meet cognitive and affective outcomes. While preliminary Z/A literature

finds a positive relationship between visitors' self-initiated reflection in exhibit spaces and

affective and cognitive reactions (Luebke & Matiasek, 2013), reflective interventions have not

been explicitly tested within these institutions. Across two studies, this dissertation aimed to

better understand whether and to what extent aquarium visitors naturally reflect at a shark exhibit

and furthermore, examine the efficacy of a reflective intervention on visitors' self-reported

curiosity and affect. Study 1 finds that exhibit dwell time and visitor motivation are related to

visitors' natural reflection at the exhibit. Study 2, which incorporated a mixed methods approach, did not find a statistical difference between the conditions (e.g., control, pre and post reflection, and post-only reflection) on visitors' self-reported curiosity and affect. However, qualitative data finds that reflections occurred after the exhibit included less negative affective comments about sharks and more surface level reflections than those occurring prior to the exhibit. The implication of these findings are discussed, along with limitations and future directions for research and practitioners examining the role of reflection within Z/As. This dissertation is available in open access at AURA (https://aura.antioch.edu) and OhioLINK ETD Center (https://etd.ohiolink.edu).

Keywords: reflection, reflection intervention, mixed methods, free-choice learning, sharks

Dedication

This dissertation is dedicated to my sisters and mom. Mom, Brittany, and Tara, without your constant love and support, I don't know who or where I would be. I would also like to dedicate my dissertation in loving memory of my father, Ricky Conklin.

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CHAPTER I: INTRODUCTION

Since the mid-1980s, scientists have been warning policymakers and the public about the

rapid loss of our planet's biodiversity (Miranda et al., 2023). Recent research suggests that the

biodiversity crisis has shifted from a biological issue to a social problem as human activities such

as excessive hunting and fishing continue to contribute to species decline (Balmford & Cowling,

2006; Benne et al., 2017; Maxwell et al., 2016). In light of these findings, platforms such as the

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services suggest the

best course of action is an integrated approach between researchers, governments, conservation

nongovernmental organizations, and the general public (Escribano et al., 2021). To that end,

Zoos and aquariums (Z/As) can play an increasingly important role in biodiversity conservation

efforts through both in situ and ex situ conservation as well as relaying conservation messages

and courses of conservation action to their visitors (Pavitt & Moss, 2019). With over 700 million

visitors entering American Z/As each year, these free-choice learning institutions facilitate

experiences with live animals to support their mission of advancing wildlife conservation and

creating a world in which all people respect, value, and conserve wildlife and wild places

(Routman et al., 2022). Visitors have the opportunity to meet this mission through live animal

exhibits, signage, on-site programs, and one on one conversations with Z/A staff and volunteers

(Minarchek et al., 2021; Pavitt & Moss, 2019; Tofield et al., 2003).

As Z/As continue to grow as conservation organizations, they deliberately design on-site

opportunities in an effort to meet intended cognitive, affective, and behavioral outcomes that

align with their missions (Lindemann-Matthies & Kamer, 2006; Minarchek et al., 2021; Pavitt &

Moss, 2019; Pepin-Neff & Wynter, 2018). An increasing body of literature is aimed at testing

and assessing the success of these opportunities (Luebke et al., 2016; Mann-Lang et al., 2016;

Minarchek et al., 2021; Myers et al., 2009; Pavitt & Moss, 2019). For instance, one study tested the impact of animal ambassador programming on visitors' empathic reactions to wildlife by combining various interpretive messaging and animal handling techniques, finding that free-choice handling and empathic messaging increased participants' empathic responses (Minarchek et al., 2021). Another study assessed the impact of immersive walk-through exhibits compared to traditional zoo exhibits on visitors' attitudes toward pro-conservation themes to find that immersive exhibits were more impactful (Pavitt & Moss, 2019). As the Association of Zoos and Aquariums (AZA) continues to push its member institutions towards encouraging greater engagement among its visitors (Fraser et al., 2023), it is important to identify and examine how and to what extent these and other strategies or mechanisms may facilitate their endeavors of enhancing curiosity and positive affect for wildlife. One potentially powerful mechanism underlying greater understanding and engagement is the process of reflection.

A variety of definitions of reflection have been proposed within the literature. For example, Moon (1999) defines reflection as a purposeful mental processing of "complex or unstructured ideas" (p. 23), while Boud et al. (1985) introduces an affective component, defining reflection as a "generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation" (p. 19). Similarly, Mann and colleagues (2009) refer to reflection as a "critical analysis of knowledge and experience to achieve deeper meaning and understanding" (p. 597). Taken together, these and other definitions (Dewey, 1933) all include an aspect of a deeper understanding of the self or one's experience. Most people engage in reflective processes naturally when asking themselves questions such as, "What went well/poorly in that situation?" or "Why do I feel this way?" (Boud, 1994, 2001). This reflective process can happen in different

ways (e.g., individual thought or through discussion; Boud et al., 1985; Moon, 1999) and at different times (e.g., in-action during the event or on-action after the event; Boud, 2001; Schön, 1983). Different experiential learning and reflective models take into account the social and temporal context of reflection and consider the overall reflective process a critical component of learning and understanding (Gutwill & Dancstep, 2017; Hägg, 2020).

Models of reflection also conceptualize and emphasize the importance of the depth or level of reflection in reaching learning outcomes (Boud, 2001; Mezirow, 1991; Moon, 1999). For example, Mezirow (1991) describes four reflective levels: habitual action (nonreflective), thoughtful action/understanding, reflection, and critical reflection. Thoughtful action is referred to as surface level reflection, and involves attempts to understand a situation, experience, or concept. Within deeper levels of reflection (e.g., reflection and critical reflection) individuals start to attach personal meaning to the experience or concept and begin challenging their previous thoughts or assumptions. While surface level reflections are important to start the reflective process, the deeper levels of reflection are thought to be necessary to move beyond abstract conceptualization and into active experimentation with the new information or assumption (Boud, 2001; Kolb, 1984).

What is generally found across the literature is that some individuals are more skilled at naturally reflecting, while others may need additional support, in the form of training and/or direct intervention, to engage in reflective practice and meet transformative learning outcomes (Cajiao & Burke, 2016; Kolb, 1984; Silvia et al., 2022). To that end, a growing body of literature focuses on the implementation of reflective interventions in an effort to purposefully improve the reflection process in learners and meet intended learning outcomes (Hägg, 2020; Imperato & Strano-Paul, 2021; Perusso et al., 2020; Renner et al., 2020). These interventions have been

implemented primarily within higher education and workplace settings (e.g., medical professional training) and typically involve individual reflective writing (e.g., journal writing) and/or group discussion (e.g., facilitated discussions; Hägg, 2020; Imperato & Strano-Paul, 2021; Perusso et al., 2020).

In workplace settings, the integration of reflective interventions has been shown to positively benefit specific work-related behaviors (e.g., Renner et al., 2020) and enhance workers' professional identity (Körkkö et al., 2016). In the context of higher education, reflective writing interventions have been shown to help students bridge the gap between theory and practice. For instance, studies have seen improvements to GPAs, gains in self-regulated learning skills, ascriptions of deeper meaning to certain clinical cases, and combating empathy fatigue for future patients (Chen & Forbes, 2014; Hägg, 2020; Shapiro et al., 2006; Sobral, 2000). In research with business graduate school students, students report that without guided reflective intervention, their learning outcomes would have remained vague, misunderstood, or lost (Perusso et al., 2020). Students further noted that it would be hard to visualize improvements moving forward without the inclusion of structured reflection and reflective components in their learning (Perusso et al., 2020).

With respect to attaining transformative learning outcomes, research suggests combining multiple points for reflection (e.g., reflecting before, during, and/or after an experience) to help individuals reach deeper levels of reflection. For example, during a new experience, external stimuli and internal thoughts and feelings strive to grab our attention (Boud, 2001; Edwards, 2017; Moon, 1999). Reflection before the event can help individuals become more aware of their expectations, allowing them to filter through these internal processes in-action (Boud, 2001; Edwards, 2017). Reflection in-action involves "intervening" during the event through either

overt behavior such as asking a question or by focusing on internal thoughts and feelings (Boud, 2001). Reflection on-action, or after the event, encourages individuals to return to the experience, attend to their feelings, and re-evaluate their experience (Boud, 2001). Boud and colleagues' experiential model (1985) suggests that all three reflection points work together to help individuals reach deeper levels of reflection necessary for transformative learning. However, reflection on-action is the most frequently measured point within this reflective process (Edwards, 2013, 2017). To that end, there is more empirical evidence suggesting that deeper levels of reflection occur after reflection on-action (Hägg, 2020; Imperato & Strano-Paul, 2021; Renner et al., 2020), but limited research exploring the depth of reflection before or in-action.

While there are examples demonstrating the influence of reflective practice within educational and workplace settings, researchers stress that reflective interventions should be tested for their effectiveness and impact in other settings (Mann et al., 2009). To that end, a few studies have examined the role of and potential for reflection and reflective practice in the context of free-choice learning environments, specifically Z/As. For instance, one study suggests that visitors rarely report engaging in deeper thought of how to apply newly obtained information they gain during their visits into their personal lives (Patrick, 2014). Comparatively, a series of correlational self-report surveys has shown hints of naturally occurring reflection among visitors (Ballantyne et al., 2011; Luebke, 2018; Luebke & Matiasek, 2013; Riedinger & Storksdieck, 2023). For instance, Luebke and Matiasek (2013) found a positive relationship between natural reflection and visitors' cognitive and affective exhibit reactions. Observational work also suggests that visitors engage in meaningful discussions with their visiting social groups while moving between exhibits (Riedinger & Storksdieck, 2023). However, and to the best of my

understanding, it remains unclear whether reflection has been explicitly leveraged as an educational tool or intervention within these settings.

Research Questions

Broadening and deepening the examination of reflection in the context of Z/As is important for a number of reasons. Integrating reflective interventions may offer a low-cost opportunity to effectively engage visitors. Furthermore, prior work outside of Z/As suggests that reflection can support cognitive and affective outcomes, which are of direct concern to the mission of Z/As and enhancing visitors' experience and targeted outcomes (e.g., curiosity, knowledge, positive affect; Luebke & Matiasek, 2013). Taken together and in light of additional theory, reflection may offer a potentially useful pathway to deepen visitors' understanding of complex topics, guide future learning, and explore emotionally challenging situations, such as endangered species, human-wildlife interactions, and human influence on the environment, more broadly (Boud et al., 1985; Kolb, 1984; Moon, 1999). Thus, the present dissertation research aimed to build on prior work assessing the state of natural reflection in a Z/A setting and furthermore, examine whether and how reflective interventions can support visitor outcomes during a one-time visit. Specifically, the research sought to address the following research questions:

1. Do adult aquarium visitors differentially self-reflect depending on their underlying motivations?

2. Does a reflective intervention in an aquarium setting enhance adult visitors' curiosity and affect for sharks?

3. What is the combined effect of multiple reflection points compared to one reflection point on adult visitors' affect and cognitions toward sharks?

Research Objectives and Approach

The present dissertation sought to build on prior work examining the state of natural reflection in Z/As and assess whether visitors differentially reflect based on underlying characteristics, including their motivation for visiting. Research acknowledges that visitors enter free-choice learning environments with pre-existing knowledge, motivations, and expectations (Ballantyne et al., 2021; Falk & Dierking, 2000; Schultz & Joordens, 2014) and that this 'personal context' can guide visitors' behavior and learning during their visit (Bueddefeld, 2019; Falk et al., 2008; Riedinger & Storksdieck, 2023). Given that Z/A visitors are differentially motivated for visiting, it's important to consider to what extent different visitor audiences naturally reflect during their visit. Thus, the present study aimed to contribute to a growing body of literature acknowledging visitor motivations and assess whether visitors' reflective experience differs depending on their personal context, specifically, their motivation for visiting.

Since reflective interventions have yet to be explicitly tested for their impact and effectiveness in a Z/A setting, the second aspect of this research sought to address this specific gap and offer a preliminary examination regarding the efficacy of reflective prompts in Z/As. A growing body of literature within higher education finds that such interventions are related to outcomes that align with Z/A missions (e.g., enhanced empathy and critical thinking skills; Imperato & Strano-Paul, 2021; Perusso et al., 2020). However, interventions in these settings typically last between a few months to a full school year, allowing for repeated opportunities to engage in reflective practice such as personal journal writing or facilitated group reflections (Perusso et al., 2020; Shapiro et al., 2006; Sobral, 2000). It remains unclear if these long-term intervention strategies can be scaled down to a singular, short-term Z/A visit, while attaining similar outcomes.

To explore the research questions, the present dissertation took a mixed methods approach across two studies. Study 1 was an extension of past Z/A literature, which finds that visitors engage in natural self and group reflection during their visits (Luebke & Matiasek, 2013; Riedinger & Storksdieck, 2023). Specifically, the first study introduced and examined how visitor motivation may influence an individual's engagement in natural reflection during their visit. This study took a quantitative approach, assessing natural reflection via a self-report scale. Study 2, on the other hand, aimed to test the effectiveness of reflective interventions during an aquarium visit. This is particularly important since prior literature suggests that reflection may not always occur naturally and thus, may need to be prompted or intentionally supported in some way (Cajiao & Burke, 2016; Silvia et al., 2022; Sobral, 2000). This study took an experimental approach, wherein visitors were assigned, by day of data collection, to one of three treatment conditions: control group (no reflective treatment), post only exhibit reflection, and pre and post exhibit reflection. Effects were measured in relation to visitors' self-reported curiosity and affect (e.g., fear, excitement, respect/admiration, concern, wonder/awe, sense of connection, love, and compassion). Qualitative analyses were also conducted to further examine the sentiment, content, and depth of reflection with respect to visitors' written reflective intervention responses.

Dissertation Outline

The present dissertation took a traditional format across five chapters: Introduction, Literature Review, Methods, Results, and Discussion/Conclusion. In Chapter II, I present a comprehensive literature review of Z/A and reflection literature. I situate Z/As as free-choice learning institutions and discuss their overarching goals of facilitating cognitive and affective outcomes for visitors that align with their institutional missions. I then turn to literature on reflection and discuss various conceptualizations of the construct as well as explore various

reflective models. Furthermore, I examine and discuss literature exploring the efficacy of reflection as a learning tool initiated by reflective interventions. I also present a series of work discussing reflection within Z/A settings. Finally, I conclude with an overview of my conceptual framework. Chapter III begins with my study design and methodological approach. Then, I describe my procedures for both Studies 1 and 2. Chapter IV presents the results of Study 1 and Study 2. The latter includes mixed methods analysis of the quantitative and qualitative results. Finally, Chapter V highlights relevant findings of the dissertation presented in subsections related to each of my three research questions. I end the chapter by presenting limitations and ideas for future research, along with both theoretical and practical contributions of my dissertation.

CHAPTER II: LITERATURE REVIEW

In the present chapter, I review theoretical and empirical literature assessing adult and free-choice learning in Z/As and how Z/As have sought to influence intended visitor outcomes. Next, I examine conceptualizations of reflection, review the literature on reflective learning models, and discuss empirical literature that assesses the efficacy of reflective interventions as a tool to supplement and enhance learning outcomes. I also review a string of literature that considers reflection within Z/As, highlighting the few studies that identify the reflective process within these institutions. Finally, I situate the broader conceptual framework of my dissertation.

Adult Learning and Free-Choice Learning Environments

Adults seek educational experiences from a variety of sources (Falk & Dierking, 2019). For some individuals this means continuing or returning to formal education through highly structured, institutionalized, curriculum-driven learning that is recognized by a grading system (Mukhalalati & Taylor, 2019). However, most adult learning is self-directed, in which individuals direct their own learning, rather than having it directed by a facilitator or teacher (Nesbit et al., 2020). Indeed, adults spend over 95% of their time learning at work and during other leisure activities, such as visits to museums, zoos, aquariums, and nature centers, reading science-related books, and watching science-related television shows (Falk & Dierking, 2010; Falk & Dierking, 2019). Non-formal, incidental, informal, and free-choice learning have all been used to describe this type of learning that's unstructured and takes place away from traditional, formal learning settings, like K-12 classrooms. Regardless of the learning context, Knowles's adult learning theory (1980) proposes that adults successfully learn when they are highly motivated, can participate in the learning process, and can apply new information into their lives

(Colbu, 2014; Manning, 2007). Undoubtedly, motivation and relevance of the material play an important role in adult learning.

While many adult learning theories exist, they can be viewed from four main perspectives: learning as an acquisitional, reflective, practice-based community, or embodied co-emergent process. When viewing learning as solely an acquisitional process, theorists suggest that individuals gain knowledge (e.g., habits, expertise, wisdom) through experience (Colbu, 2014; Fenwick & Tennant, 2004). Reflective learning demands more effort from the individual, requiring a conscious effort to construct new meaning from new information or experiences (Colbu, 2014; Fenwick & Tennant, 2004; Mezirow, 1991). Conversely, learning as a practice-based community does not focus on personal mental meaning, but more so on the individual's ability to meaningfully participate in everyday activities within their different communities (e.g., following social norms of the group; Colbu, 2014; Fenwick & Tennant, 2004). More recent adult learning theories move beyond a "brain-centered view" of learning, and instead, situate learning as a co-emergent process rooted in cognition, personal identity, and the physical environment (Colbu, 2014; Fenwick & Tennant, 2004). Researchers suggest that adult learning cannot be explained by one single theory, which can be exemplified by the overlap of these four perspectives (Fenwick & Tennant, 2004). However, the present dissertation mainly focused on learning as a reflective process, incorporating multiple reflective models, while also recognizing the role of motivation for engagement.

The present dissertation viewed adult learning in the context of free-choice learning environments. Institutions such as museums, Z/As, and nature centers are often referred to as free-choice learning environments because they allow their visitors choice and control in the experiences they participate in, resulting in voluntary, self-paced learning (Falk, 2001; Falk &

Dierking, 2000). Much like other forms of informal learning, this process is individualized and self-directed, as visitors to such institutions tend to selectively choose experiences they find interesting, allowing them to build upon, strengthen, and/or reinforce their underlying personal interests (Falk et al., 2012; Falk & Dierking, 2019). Research within Z/A settings supports this assertion, finding that visitors hold strong pre-existing knowledge and positive attitudes toward animals and their conservation prior to visiting (Friedrich et al., 2014). Still, research shows that new learning does occur within these institutions, particularly through structured encounters and programming, which can influence social learning (Falk & Dierking, 2019; Renner, 2020).

There are learning frameworks and theories to help explain and understand how new learning occurs within free-choice learning institutions. For instance, the Contextual Model of Learning (CML), which is both theoretically and empirically informed via lived visitor experiences (Bueddefeld, 2019; Falk & Dierking, 2000), suggests that visitor learning outcomes are contextually driven and dependent on a continuous dialogue between three main contexts: personal, sociocultural, and physical (Falk & Dierking, 2000). The personal context acknowledges that learning is not isolated to a singular visit, but is an ongoing experience reliant on each visitors' prior knowledge, experiences, and motivations. Since humans are social creatures, CML also grounds the sociocultural construction of learning. Learning within the sociocultural context involves interactions with one's visiting social group and is also mediated by staff and volunteers at the institution. Finally, learning also occurs within the physical context, thus one should expect visitors to engage with and react to signage and interactive displays within the physical exhibit space. While this framework can be applied in any free-choice learning environment, Z/As are of particular interest, as they attract 700 million visitors each year (Kubarek et al., 2023; Routman et al., 2022). Z/As have a critically unique

opportunity to inspire, educate, and influence millions on issues of biodiversity conservation and climate change, among others.

Z/As have evolved over time, beginning in the 19th century as menageries displaying animals in cages, to places of applied conservation science and ecology in the 20th century (Rabb & Saunders, 2005). This shift can, in part, be attributed to the Association of Zoos and Aquariums (AZA), the North American accrediting body, that ensures Z/As provide the highest standard of animal welfare, care, and management (Maynard et al., 2020). While Z/As have placed an even greater emphasis on conservation, with dedicated on- and off-site efforts to protect and conserve endangered wildlife, they have also dedicated substantial resources to more directly influence the environmental beliefs, attitudes, and behaviors among their many visitors (Heimlich & Ardoin, 2023; Maynard et al., 2020). Through various structured opportunities (e.g., signage, exhibit design, programs), Z/As engage demographically diverse audiences with the goal of encouraging greater pro-environmental cognitive, affective, and behavioral outcomes (Lindemann-Matthies & Kamer, 2006; Minarchek et al., 2021; Pepin-Neff & Wynter, 2018). These intended outcomes are further discussed in the next section.

Visitor Outcomes in Zoos and Aquariums

Before exploring intended visitor outcomes in Z/As, it is necessary to understand the visitor experience. The visitor experience has been defined as the "individual visitors' experiences and their perceptions, attitudes and behaviors towards captive animals, enclosures, displays, signage, interactive programs, encounters, and conversations that they have while onsite" (Learmonth et al., 2021, p. 633). Since learning in Z/As is self-directed, visitors craft their own experience by selecting to engage with exhibits, signage, programs, and conversations that are of personal interest to them (Ballantyne et al., 2021; Falk & Dierking, 2019). However,

Z/As can influence visitors' perceptions and attitudes of nature and wildlife through interpretation (or information) provided in these offerings (Ballantyne et al., 2023). Interpretation is essentially the "so what" of offered experiences, highlighting why certain topics and information are important (Ham, 2013). Put more simply, interpretation is a broad and intentional method for delivering education in Z/A settings as a way to support visitor understanding, affect and behavior. Interpretation can take many forms, from the design of exhibit spaces and signage to programmatic features where visitors are interacting with staff. For example, signage at an animal exhibit can provide taxonomic information about exhibited species or focus on conservation messaging and actionable steps visitors can take to help the species (Ballantyne et al., 2021). One study found that zoo visitors report interpretation through staff encounters and exhibit features (such as signage) to be the two most impactful sources of knowledge during their visit (Ouellette, 2017). To that end, interactive interpretation facilitated by Z/A staff and volunteers has been shown to be four times more likely to attract and hold visitors' attention compared to signage that provides information through text and graphic (Edney et al., 2023).

Designing and assessing effective interpretation has been the focus of Z/As for decades, as Z/A visitors can play an important role in supporting conservation efforts both near and far. Social scientists, in particular, have played an increasing role in helping Z/As design and evaluate interpretive offerings throughout their institutions (Grajal et al., 2022; Kubarek et al., 2023). Much of this work has focused on cognitive and affective outcomes, given their relationship to PEB (Berenguer, 2010; Myers et al., 2009; Thomas, 2020). Cognitive outcomes generally assess awareness, knowledge acquisition, and curiosity (Lindemann-Matthies & Kamer, 2006, Mast et al., 2018; Pavitt & Moss, 2019). Research has shown that experiences such

as artifact touch tables (Lindemann-Matthies & Kamer, 2006), educational programs (Perdue et al., 2012), and exhibit characteristics such as live videos result in cognitive outcomes such as knowledge gains (Pavitt & Moss, 2019). For example, one study found that visitors at an orangutan exhibit experienced significantly more knowledge gains when live presentations or videos were present compared to the same information being available on signage (Perdue et al., 2012). Further research reveals significant knowledge gains about the biology, ecology, and conservation of bearded vultures when visitors engaged with an artifact touch table compared to visitors who were presented with the same information on exhibit signage (Lindemann-Matthies & Kamer, 2006). Although knowledge is an important factor in shaping PEB, knowledge alone is not enough to initiate PEB (Carmi et al., 2015; Schultz, 2001; Wiek et al., 2011).

Affective outcomes have typically involved fostering positive emotions, creating connections between people and animals/nature, as well as promoting a sense of wonder and awe (Minarchek et al., 2021; Myers et al., 2004; Thomas, 2020). Similar to research on cognitive gains, research shows that Z/As can elicit affective outcomes from visitors by providing exhibit animals with enrichment (Powell & Bullock, 2014), immersive exhibit designs (Pavitt & Moss, 2019), and intentional empathic messaging in animal ambassador programs (Minarchek et al., 2021). Research suggests that emotions about the environment mediate the relationship between knowledge and PEB (Carmi et al., 2015). Indeed, studies have found individuals with high levels of empathy report greater concern for the environment, and engage in more PEB (Berenguer, 2010; Schultz, 2001), and those who include nature in their self-concept find it easier to empathize with the environment (Nolan & Schultz, 2015). For example, one study tested the impact of traditional messaging (i.e., discussing an animal's natural history) compared to empathic messaging (i.e., using an animal's name and encouraging perspective taking) in an

animal ambassador program (Minarchek et al., 2021). As hypothesized, participants who were exposed to empathic messaging experienced higher empathic reactions than the traditional messaging group. Taken together, these studies show that Z/As can utilize deliberate techniques to elicit cognitive and affective outcomes from visitors.

Although one of the foundational principles of interpretation (and effective environmental communication) suggests that it should be tailored to meet audiences where they are at (Falk & Dierking, 2019; Markowitz & Guckian, 2018), understanding how visitors, with various underlying motivations and predispositions, may differentially respond to Z/A programming has only recently garnered increasing attention across literature within free-choice learning environments. The idea that visitors enter free-choice learning environments with pre-existing perceptions, attitudes, and beliefs that can inform cognitive and affective outcomes upon exiting, is grounded in the personal context of the CML (Falk et al., 2008; Falk & Dierking, 2000; Myers et al., 2004). To that end, visitors at free-choice learning institutions have been found to engage with a topic when they felt that it impacted their lives and detached from the topic when their learning experience failed to challenge what they already knew (Rennie & Williams, 2006). Additionally, repeat visitors are more likely to have a deeper understanding of exhibit content than first time visitors (Stocklmayer & Gilbert, 2002). At a more nuanced level, Ballantyne et al. (2021) argues that interpretation should be more nuanced and specifically designed to build on disparate motivational and value priorities across a range of visitors. Compared to a control group, Ballantyne and colleagues (2021) found that visitors who received values-based interpretive materials reported higher levels of reflective engagement, behavioral intention, and were more likely to mention conservation aspects in a 4-week follow-up. More specifically, visitors who prioritized self-transcendence values sought information that ensured

animal welfare, whereas visitors who prioritized self-enhancement described scientific information presented in the exhibits as the most memorable aspect of the visit. Comparatively, those who prioritized openness to change found personal experiences with animals at the institution to be most memorable, while visitors who prioritized conservation values had the most memorable experience when they felt the exhibit "transformed" them into the animal's habitat (Ballantyne at al., 2021). In light of the aforementioned work in Z/A settings, these findings suggest that visitors' experiences and resulting outcomes are not only informed by on-site programming, but also by their entering narrative and value structures.

With respect to a more nuanced understanding and application of visitors underlying motivations, Falk et al. (2007) proposed an identity-related motivations model, which centers five visitor motivation categories for visiting free-choice learning environments: explorers, facilitators, professionals/hobbyists, experience seekers, and rechargers/spiritual pilgrims. Explorers are described as curiosity driven and interested in what the institution has to offer (e.g., information about certain animal species), whereas facilitators visit primarily to enable another's learning experience, such as their children or grandchildren. Hobbyists or professionals are said to visit because they feel a connection between the institution and their own interest, such as opportunities for photography. Experience seekers, on the other hand, are described as visiting because they perceive the site as important, perhaps due to new exhibits or new animals at the site. Finally, Falk et al. (2007) defines rechargers as those seeking to have a reflective or restorative experience, which may involve coming to the aquarium during less busy times to sit and watch different species. While the model provides an initial categorization of different visitor motivations, some argue that it fails to capture visitors who may fall under multiple motivations (Dawson & Jensen, 2011). Indeed, studies show that some visitors can fall within

multiple motivations in a single visit (Rowe & Nickels, 2011), and these motivations can shift

for repeat visitors (Riedinger & Storksdieck, 2023). With that said, a large-scale national study

within Z/As found that visitors do identify with at least one of these five motivational categories

(Falk et al., 2008; Heimlich et al., 2004).

Falk and colleagues' (2007) identity-related motivations model may provide more insight

into creating Z/A opportunities that elicit cognitive and affective outcomes among various

visitors. For example, one study used post-visit interviews to assess such outcomes (Falk et al.,

2008). When results were aggregated, there was no statistical difference for either outcome.

However, when segmenting visitors into the five visitor motivation types, findings revealed that

experience seekers had increases in both learning and affective outcomes and that facilitators and

hobbyists also saw significant affective changes. Explorers and rechargers were the only

motivation groups to show no change in either domain. While research is limited, Z/As might

benefit from conducting analyses based on visitor motivation and other visitor entry narratives to

understand how pre-existing attitudes and underlying motivations may influence (e.g., personal

context) visitors' experience.

In addition to understanding the potential influence of visitors entering narrative and

diversifying interpretation, exhibit dwell time has also been shown to influence visitor outcomes

within Z/As. For the most part, exhibit dwell time (the amount of time visitors spend at an

exhibit), has been observed primarily for its relation to visitors' level of engagement within the

exhibit space (Kohut & Katona, 2022; Luebke et al., 2016; Moss & Esson, 2010; Pavitt & Moss,

2019). That is, researchers have used dwell time as a proxy for assessing the level of visitors'

engagement with the exhibit space (e.g., longer dwell time, higher engagement). Different

structural components, such as exhibit design, the animal's taxonomic categorization, and type of

interpretation, are related to exhibit dwell time (Kohut & Katona, 2022; Moss & Esson, 2010). For example, more angles in which visitors can view the exhibited species as well as diverse species within one exhibit are both positively correlated with exhibit dwell time (Kohut & Katona, 2022). Interpretative elements may also influence dwell time. Interpretation provided by zoo staff has been shown to increase dwell time by four times compared to standard signage with text and graphics (Edney et al., 2023). Dwell time may also support visitors' reflection. Pavitt and Moss (2019) found that longer dwell times were positively related to both surface level and deeper level comments among visitors. The researchers defined surface level comments as descriptive responses to the exhibit, while deeper level comments included emotional responses to the animal as well as posing questions to zoo staff. Taken together, this body of work suggests that exhibit dwell time may be an influential factor to explore alongside natural reflection among visitors.

Taken together, Z/As have the potential to influence important visitor outcomes, in part, by designing and offering experiences that encourage visitors' positive associations with and understanding of wildlife, and furthermore, attending to visitors' entry narratives and motivations for visiting. Work in other domains, including higher education and professional development, suggests that one potentially underappreciated mechanism to facilitate the broader engagement of Z/A visitors is reflection (Ballantyne et al., 2011; Riedinger & Storksdieck, 2023). Promoting self-reflection may provide a means for Z/A visitors to ascribe personal meaning to their experience and reach both affective and cognitive gains. However, the role of and opportunity for reflection is under-examined in the context of free-choice learning institutions despite its connection to cognitive, affective, and behavioral outcomes (Chen & Forbes, 2014; Imperato & Strano-Paul, 2021; Platzer et al., 2000).

Defining Reflection and Reflection Models

The concept of reflection and its application has garnered attention across various applied contexts (e.g., training of healthcare professionals, educational pedagogy; Chen & Forbes, 2014; Perusso et al., 2020; Renner et al., 2020). A variety of definitions of reflection exist, mostly drawing on key educational theorists who have situated it as a critical learning tool. Dewey (1933) first defined reflection as "the active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 9). Other definitions have similarly situated reflection in conversation with aspects of what is considered critical thinking. For instance, Moon (1999) described reflection as a "form of mental processing with a purpose and/or anticipated outcome that is applied to relatively complex or unstructured ideas for which there is not an obvious solution" (p. 23). Comparatively, Boud et al. (1985) offered the first definition of reflection that centered the role of affect in addition to that of cognition, by defining reflection as "a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation" (p.19).

These and related definitions (e.g., Schön, 1983) informed Mann et al. (2009) synthesis of the field's varied conceptualizations of reflection, noting that reflection is largely understood as the "critical analysis of knowledge and experience to achieve deeper meaning and understanding" (p. 597). Marshall's (2019) thematic synthesis found the most common themes used to describe reflection include cognition, integrative, iterative, and active. Based on these themes, Marshall (2019) further defined reflection as "a careful examination and bringing together of ideas to create new insight through ongoing cycles of expression and re/evaluation"

(p. 411). Collectively, these definitions similarly acknowledge reflection as a conscious and purposeful cognitive process, with an emphasis on achieving greater or deeper meaning.

In addition to the diverse ways in which reflection is defined, models of reflection and reflective practice describe the reflective process in different ways. Across most models, reflection is situated as an engaged process, activated by the awareness and/or need to return to an experience to deliberately examine it and in turn, integrate what is learned to inform future behavior and update beliefs (Mann et al., 2009). In a review of models of reflection described by Dewey (1933), Schön (1983, 1987), Boud et al. (1985), Mezirow (1991), Hatton and Smith (1995) and Moon (1999), Mann et al. (2009) suggest that models can be classified along two major dimensions: iterative and/or vertical. The iterative dimension involves an experiential component in which a new experience triggers reflection, contributing to a new understanding, and in turn, creating the potential for an individual to act differently when presented with this experience or knowledge in the future. Comparatively, the vertical dimension is characterized by different levels of reflection, ranging from surface level, rudimentary processing to more elaborate forms of critical reflection (Mann et al., 2009). More simply put, iterative models characterize the process of reflection, whereas vertical models describe the degree or level to which reflection occurs.

Models of experiential learning are often discussed in direct relation to and/or adjacent to models of reflective practice (Boud, 2001; Moon, 2004; Schön, 1983). This is, in part, due to the iterative nature or process of experiential learning models and perhaps more critically, that reflective practice and experiential learning models concern non-mediated, self-directed learning (e.g., Kolb, 1984; Moon, 2004). Like models of reflection, experiential learning involves constructing new knowledge, skills, and value from direct experiences, including both past and

new experiences (Andresen et al., 2020; Jacobs, 1999). Kolb's experiential learning cycle (1984) was one of the first experiential learning models to promote reflection and reflective practice in the learning process. The model provides an oversimplified experiential learning process involving four steps: concrete experience, reflective observation, abstract conceptualization, and active experimentation. More simply put, the learner has a new experience and reflects deeply on it, allowing them to conceptualize or interpret the experience and draw meaning from it. As a result, the learner will start to experiment with this new information and meaning in their lives. A strength of Kolb's experiential learning cycle (1984) is the identification of the temporal process of experience, reflection, and learning. However, a weakness is the cycle's lack of attention to the social aspects of learning (Boud et al., 1993; Radović et al., 2021). Building on strengths and addressing weaknesses of Kolb's (1984) experiential learning cycle gave rise to reflective models Mann et al. (2009) describe as the iterative dimension.

Models that describe reflection along the iterative dimension, detail processes where individuals have an experience, return to it by attending to their thoughts and feelings, re-evaluate it, and then come to the resulting outcome (Mann et al., 2009). In many ways, iterative reflective models build on the distinct temporal stages of learning (and reflection) identified by Kolb (1984). Some iterative models highlight the importance of a source of conflict or tension that individuals encounter and reflect upon. For instance, Mezirow's (1981, 1991) transformative learning theory proposes that iterative reflective processes are facilitated by the presence of a disorienting dilemma/conflict that gives rise to unpleasant feelings and in turn, prompts self-reflection. Disorienting dilemmas and/or conflict has been differentially conceptualized across the literature, originally viewed as a major life event crisis such as an HIV diagnosis (Baumgartner, 2002; Courtenay et al., 2000; Mezirow, 1991). However, within the

context of adult learning (Procee, 2006), higher education (Kreber, 2005), and free choice learning settings (Chisolm et al., 2020), the disorienting dilemma has also been viewed as "a moderate growing sense of dissatisfaction with one's old meaning structure" (Mälkki, 2012, p. 208).

Other iterative models, such as Boud's (1994, 2001) experiential model, focus more specifically on the role of the learner throughout the reflective process, suggesting that learning from an experience requires more active reflective engagement from the learner before, during, and after an event. This structure also echoes Schön's (1987) model, in which reflection can start during the experience (i.e., 'reflection in-action') and continue after the experience (i.e., 'reflection on-action'). Reflection before an event (e.g., before the occurrence of a disorienting dilemma) and reflection in-action are said to allow the individual to become aware of their thoughts and emotions (Boud, 1999; Schön, 1987), while reflection on-action can give rise to the abstract conceptualization and active experimentation stages described by Kolb (1984). While there are distinctions between these models, they similarly describe reflective thinking as a process that transforms a lived experience or new information into "knowing," with reflection acting as the key component between "thinking" and "doing" (Boud, 1999; Kolb, 1984; Mezirow, 1991; Schön, 1987). Iterative models that situate reflection as a process throughout the learning process have encouraged practitioners to examine and leverage opportunities for reflection in- and on-action to maximize transformative learning (Perusso et al., 2020).

Comparatively, vertical models propose that it is the depth or level of reflection that influences future impacts and application (e.g., Mezirow, 1991; Moon, 1999). For example, in the presence of new experiences, knowledge, or beliefs one might simply revisit past experiences, knowledge, or beliefs, or they can, at a more nuanced level, consider how this new

information can be implemented into their lives and how to actively institute this change (Fleck & Fitzpatrick, 2010). There are many models that conceptualize reflection in terms of a vertical dimension, all similarly describing reflection as possessing characteristics that enable either surface or deeper levels of analysis to manifest. Mezirow's critical reflection model (1991) breaks down reflective depth into four levels (from low to high levels of reflective depth): habitual action, thoughtful action/understanding, reflection, and critical reflection. Habitual action involves automatic thinking that requires little to no conscious thought, and therefore, no reflection (Kember et al., 2000; Mezirow, 1991). Thoughtful action, or surface level reflections, involve an attempt to understand a concept or topic, while reflection involves deeper thought in which the individual attaches personal meaning to the information. The highest level of reflection, critical reflection, requires the individual to start challenging their previous assumptions. Moon (1999) differentially conceives reflective depth, suggesting that individuals move from increasing analytical stages of reflection: 'noticing,' 'making sense,' 'making meaning,' 'working with meaning,' and finally, 'transformative learning.' Different levels of reflection come with their own benefits. Surface reflection can help an individual become more self-aware (Baker, 1996), while deeper third and fourth levels of reflection are said to help with the development of critical thinking skills and transform life experiences into learning (Kolb, 1984).

Iterative and vertical models are not mutually exclusive. For instance, according to models within the iterative dimension, deeper levels of reflection are required to move beyond the stage of abstract conceptualization and into more active experimentation (Boud, 1994, 2001; Kolb, 1984). The benefit of using a combination of iterative and vertical models to help structure reflection is that they encourage a continuous cycle and revisitation of an experience, while

challenging habitual ways of thinking to promote more enhanced and critical levels of analysis and thought. In this way, iterative and vertical dimensions of reflective models can work together to reach experiential and transformative learning outcomes. That is, people can reflect on experiences at different times and in different ways. This also includes affect, since examining emotions is a core aspect of the many models of reflective practice. Drawing on these models, researchers and practitioners alike have sought to address whether, how, and to what extent reflective strategies, as an educational tool, can support different types of learning experiences.

Reflection as a Learning Tool

Extant research across various domains (e.g., education, business, nursing, etc.) has sought to better understand whether some individuals are more or less predisposed to naturally reflect and furthermore, how and to what extent reflection can be leveraged as a tool to support deeper affective and cognitive learning outcomes. Much of this work suggests that reflection has a positive impact on learning outcomes and professional development (Lambie, 2009; Perusso et al., 2020; Renner et al., 2020). To some degree, reflection is something that people naturally engage in. For example, research with postgraduate students found that a majority of participants (65%) regularly utilized a reflection portfolio to record data and reflect on the information (Pearson & Heywood, 2004). Research also finds that individual differences may influence one's capacity for natural reflection. For instance, correlational work finds that high neurotic personality traits (Silvia et al., 2022), a small vocabulary (Xu, 2011), and increased years in clinical practice (Mamede & Schmidt, 2005) are all associated with lower levels of reflection. Furthermore, Kolb (1984) claims that some individuals are naturally skilled at reflecting, while others may need more training to deliberately incorporate reflective practices. Indeed, a growing

body of literature focuses on the implementation of reflective interventions in an effort to

purposefully improve the reflection process in learners and meet intended learning outcomes

(Hägg, 2020; Imperato & Strano-Paul, 2021; Luo et al., 2019; Perusso et al., 2020; Renner et al.,

2020).

A number of reflective intervention methods have been tested across various formal

education and workplace settings. Many of these empirical investigations explore when and how

reflection is best served. While some studies involve reflective interventions at the group level

(Imperato & Strano-Paul, 2021; Sobral, 2000), most interventions are in the form of individual

reflective writing, either through journal writing or personal blogging (Hägg, 2020; Körkkö et

al., 2016; Perusso et al., 2020; Shapiro et al., 2006). Reflective writing interventions allow for a

more personalized reflective experience in which individuals can grow to understand their own

learning processes, and enhance their creativity (Moon, 1999). Furthermore, reflective writing

can provide an alternative "voice" for those who may not be skilled at expressing themselves

(Boud, 2001; Moon 1999). However, both group level and personal written reflective

interventions have resulted in similar outcomes such as enhanced empathy (Imperato &

Strano-Paul, 2021; Shapiro et al., 2006). Since both reflective intervention methods are effective

in achieving intended outcomes, the selected design may be dependent on the setting in which it

is applied.

Despite the reflective intervention method, researchers place an emphasis on the

importance of guided and relevant reflective prompts. Indeed, part of the challenge is translating

reflective and experiential learning models into practice. Studies have implemented different and

context-specific approaches for how to encourage people to think about an experience and have

come up with 'cues' or prompting questions to support reflective practice. For example, research

with clinical students typically requires students to talk or write, in a group or individual setting, about a clinical case they were involved in that raised emotional or inner-life reactions (Chen & Forbes, 2014; Imperato & Strano-Paul, 2021). Findings reveal these focused prompts have helped enhance students' empathy for patients, and overall emotional intelligence (Imperato & Strano-Paul, 2021; Shapiro et al., 2006). Furthermore, reflective interventions in a workplace setting have prompted workers to reflect upon how certain hypothetical emergency and social situations in the workplace were handled, as well as reflections on their work performance prior to the implementation of a work-tracking app (Renner et al., 2020). After a few months of using the app, participants performed a written post-reflection of their work performance, finding that the reflective apps were helpful in triggering new reflective processes among workers, and positively benefited specific work-related behaviors.

In addition to selecting an appropriate reflective intervention method and prompt, researchers have also assessed the most impactful time to initiate reflective processes. Boud and colleagues' experiential model (1985) suggests that reflection before, -in, and on-action work together to help individuals achieve transformative learning outcomes. This integrative approach is evident in the literature, as most research assesses reflective interventions in and on-action over the course of a school semester (Imperato & Strano-Paul, 2021; Luo et al., 2019; Ramlal & Augustin, 2020; Shapiro et al., 2006; Sobral, 2000). There seems to be no difference between biweekly and monthly written reflections throughout the semester, as studies assessing both time intervals found improvements in students' GPAs, self-regulated learning skills, ability to ascribe meaning to certain clinical cases, and overall empathy scores (Chen & Forbes, 2014; Hägg, 2020; Ramlal & Augustin, 2020; Shapiro et al., 2006; Sobral, 2000). However, only one of these studies utilized a before-action reflection, whose main purpose was to act as a comparison to

post-semester reflections (Ramlal & Augustin, 2020). In that study, researchers found that reflective interventions over the course of a semester helped not only improve students' depth of reflective writing when compared to the pre-semester reflection, but also helped to improve their overall course grade (Ramlal & Augustin, 2020). More research implementing reflection before-action is needed to not only act as a comparison to post-intervention reflections, but also to assess its impact on reflection in and on-action.

The duration of reflective interventions may also play an important role in meeting intended outcomes. For example, one longitudinal study embedded multiple reflection points beyond one semester and into a four-year undergraduate program (Perusso et al., 2020). Throughout the program students participated in reflection through guided dialogue in class, group meeting outside of class time, and a one-on-one self-evaluation at the end of each year in the program. Reflection during class acted as a type of reflection in-action, that helped students notice important content and begin to think about how theories can be applied in practice. Group reflection after class, or on-action, was found to help students align their internal perceptions with reality by increasing self-awareness of their own capabilities and enhancing their ability to deal with frustrations and criticism. One-on-one self-evaluations between a student and a mediator acted as a type of critical reflection, which helped students to better process insights from their experiences and find suggestions for improvements in the upcoming year. Students noted the importance of these integrated reflective strategies throughout their program, stating that learning outcomes would have remained vague, misunderstood, or lost and furthermore, found that it would be difficult to visualize improvements moving forward without these reflective components. In sum, multiple reflection points over the course of an entire experience may work best to help individuals achieve intended outcomes.

While control groups are rare in these intervention studies, they are not impossible, and may just require different prompts. For example, Shapiro et al. (2006) randomly assigned students to write monthly essays reflecting on hypothetical situations from either a reflective point-of-view or a clinical reasoning standpoint, finding that participants who wrote from a clinical reasoning standpoint were more likely to distance themselves from the patient, while those in the reflective point-of-view standpoint exhibited more compassion for patients. Taken together, in designing and implementing reflective interventions, researchers and practitioners need to be mindful of the constraints and opportunities inherent to the setting and align approaches with the intended outcomes of its application. Ideally, this includes providing a comparison group to make a definitive claim about the intervention's effectiveness.

Measuring Reflective Writing

As higher education continues to explore the impact of reflection, measurement tools have been developed to assess the depth of students' reflective writing (e.g., vertical dimension). For instance, Kember and colleagues (2008) developed a rigorous process and protocol for assessing reflective depth across students' reflective writing by identifying elements of Mezirow's critical reflection model (1991): habitual action, thoughtful action/understanding, reflection and critical reflection. In line with Mezirow's model, Kember et al. (2008) identified elements of habitual action as writing that included basic fact reporting, whereas thoughtful action (e.g., the second level) was detailed as writing that moved beyond fact reporting and showed evidence of trying to understand a concept. Elements of the third level, reflection, included writing that mentioned not only understanding the concept, but also included statements related to making it personally relevant and meaningful. The final level, critical reflection, was identified by changes in perspective relative to a fundamental belief. Since the process of critical

reflection takes time (Mezirow, 1991), it was the least likely level represented in students' reflective writing (Kember et al., 2008). Kember and colleagues influenced the creation of a more reliable and valid measure, the Reflection Evaluation for Learners' Enhanced Competencies Tool (REFLECT; Wald et al., 2012).

Similar to Kember and colleagues' (2008) tool, the REFLECT rubric includes four levels of reflection, adding an additional measure for those that fall within the fourth level, critical reflection (Wald et al., 2012). The four levels of reflection include: habitual action (nonreflective), thoughtful action, reflection, and critical reflection. The latter can be further classified as confirmatory learning or transformative reflection and learning. Each level of reflection is measured on a rubric assessing the following five criteria: writing spectrum, presence, description of conflict or disorienting dilemma, attending to emotions, and analysis/meaning making. Critical reflections are further assessed on the rubric as either transformative (e.g., conveys a sense of a breakthrough) or confirmatory (e.g., previous frames of reference are confirmed through critical thinking). The REFLECT rubric has been validated (Daryazadeh et al., 2020) and used in research studies to evaluate the depth of students' reflective writing (Brown et al., 2020). The creation and use of such tools exemplify the importance of evaluating reflective writing and interventions within curriculums by understanding the connection between the depth of individuals' reflection and the achievement of intended outcomes.

Taking together the various reflective strategies mentioned in this section, it is important to note that many of these students and professionals reported self-reflecting on their own prior to these interventions (Hägg, 2020; Perusso et al., 2020; Renner et al., 2020). This suggests that reflection occurs naturally within the learning process. However, the added dialogue through

deliberate interventions elicited engagement from learners that may not occur otherwise. Within higher education and the workplace, such strategies have been shown to aid in deeper reflective support and self-awareness, helping individuals to reach personal growth as well as intended cognitive and affective outcomes. While reflective interventions have been shown to influence intended outcomes across various educational and workplace settings, limited work has examined the role of and potential of reflection in free-choice learning environments such as Z/As. These institutions support many of the influential components of reflective interventions (e.g., group discussions, experiential learning environment), and some research suggests that visitors may naturally reflect in these settings (e.g., Ballantyne et al., 2011; Luebke, 2018; Luebke & Matiasek, 2013). However, it remains unclear how and whether intentional reflective interventions can prompt deeper levels of reflection among visitors and assist in reaching intended cognitive and affective outcomes.

Reflection in Zoos and Aquariums

Limited research has examined reflection in the context of Z/As. Most of this work has examined whether and to what extent visitors naturally reflect-in-action within these spaces (Luebke & Matiasek, 2013; Packer & Ballantyne, 2016; Pekarik et al., 1999). Research suggests that visitors experience reflective thought relative to their Z/A experience. Exit-interviews from various free-choice learning institutions revealed that visitors report reflective thoughts such as, imagining another time or place, recalling episodic memories, reflecting on the setting or an object's meaning, spiritual connection, and an overall sense of belonging or connection (Packer & Ballantyne, 2016; Pekarik et al., 1999). However, visitors self-report their overall experience as more social than reflective in post-visit surveys (Packer et al., 2018; Pekarik et al., 1999). While visitors appear to engage in reflective thought with respect to their overall experience,

correlational and observational work suggests that reflection may occur in more specific relation to and following individual exhibit experiences.

Both quantitative and qualitative research support the notion that reflection in-action occurs within zoo exhibits (Luebke, 2018; Luebke & Matiasek, 2013). In one correlational study, researchers surveyed visitors about their introspection and reflection, emotional responses to viewing animals, cognitive engagement, and staff interaction across four different exhibits (Luebke & Matiasek, 2013). The researchers measured introspection/reflection via affective components including feelings of relaxation and spirituality, and cognitive components such as reflecting on new ideas, recalling episodic memories, and perceived compatibility between one's own interests and exhibit features. Introspection/reflection was associated with expanded interest in the animals on exhibit, deeper thinking about the animal's thoughts and feelings, stronger connection to nature, and a more meaningful interest in wildlife conservation. A follow-up study within the same exhibits, asked visitors to describe an extra special experience through an open-ended question (Luebke, 2018). While a majority of participants (45.3%) provided comments related to observed animal behavior, 25.6% involved themes with a reflective focus on themselves. These themes included remembering something from their past, deeper thinking into human connection with nature, and caring reflections about animals, environmental issues, and conservation. While limited, this study suggests that not only does natural, unprompted reflection occur in exhibits, but it may also be related to intended zoo outcomes (Luebke, 2018).

In a related domain, wildlife tourists have also been shown to engage in reflection on-action, in the days, weeks, and months after their experience (Ballantyne et al., 2011). Ballantyne and colleagues (2011) surveyed (e.g., open ended questions) visitors four months after one of four experiences (i.e., aquarium, marine-based theme park, turtle viewing, or whale

watching). Qualitative analyses revealed four categories of responses, including: sensory impressions, emotional affinity, reflective response, and behavioral response. Reflective responses were identified when visitors indicated they reflected on things they thought or heard during the experience, or when they acknowledged new insights as a result of cognitively processing their experience. Collectively, reflective responses and emotional affinity appeared to have a powerful impact on visitors. For example, visitors reflected on factors impacting animal conservation status much more frequently than factual information presented in talks and signs. These reflections brought about strong feelings of heartbreak, passion, and panic, which were associated with a heightened awareness of the need for conservation action (Ballantyne et al., 2011). Furthermore, for those who were environmentally aware before the experience, reflection on-action seemed to reinforce pre-existing environmental beliefs and attitudes. When emotional affinity and reflection worked together, visitors had a deeper concern and respect not only for the animals they encountered during their experience, but for the species as a whole. As indicated in various experiential learning models, the experience and subsequent reflection of the experience appeared to make environmental issues more personal and significant to these visitors.

Reflection and meaning making has also been shown to occur in social groups. In a larger study across three zoos and three aquariums, visitors were asked to wear a GoPro during their visit as a way to better understand where and when visitors made meaning of various experiences throughout their visit (Riedinger & Storksdieck, 2023). They defined meaning making talk as conversations in which visitors tried to process information, make sense of their exhibit experience, and make connections to previous knowledge or experiences (Riedinger & Storksdieck, 2023; Zimmerman et al., 2010). Film from the GoPros revealed that conversations happened most frequently between exhibits, suggesting this as a period when people revisit and

process events. Similarly, the Examining Visitor Engagement at Touch Tanks (EVEnTT) project found that touch tank visitors used the time following their exhibit to revisit their experience (Kisiel et al., 2012). The EVEnTT project investigated family activity and discussion at touch tanks in four west-coast aquariums and found that without direct mediation from staff and/or volunteers, families engaged in talk related to making and challenging claims (Kisiel et al., 2012). Furthermore, families that engaged in their own touch tank "debrief" after the experience had deeper engagement than families who did not debrief among the group. Follow up interviews revealed that families most frequently debriefed on basic characteristics of the animal, how the experience challenged previous thoughts as well as animal behavior and physiology (Rowe et al., 2023). Taken together, the opportunity for reflection may be particularly salient immediately following visitors experience in individual exhibits. Specifically, these post-exhibit spaces may provide a promising opportunity to enhance visitors' reflective experience and metacognitive awareness. Such interventions may help drive meaning making conversations into more conservation action-driven dialogue that aligns with intended Z/A outcomes.

Although reflective interventions have not been tested in a Z/A setting, limited research has tested the impact of focused questions embedded within a museum exhibit on visitors' metacognition (Gutwill & Dancstep, 2017). Specifically, the researchers were interested in an intervention to enhance metacognitive conversations, defined as any talk in which the visitor revealed an awareness about their own thinking process, within an exhibit (Gutwill & Dancstep, 2017). Researchers designed a within-subjects experiment in which participants walked through an exhibit with no metacognitive prompt, and two additional exhibits in which they had to flip a panel to read a metacognitive prompt in the form of a question either about the exhibit itself, or about real-world application of exhibit content. The intervention in which participants were

asked a specific question about their exhibit experience increased metacognitive talk by about 30%, while real-world application questions increased it by about 25% when both were compared to the baseline. While not deliberately identified as a 'reflective' cue, these results indicate that deeper thought about exhibit content can be prompted and enhanced through an intervention within the exhibit. The following section describes the role reflection may play in helping visitors reach intended Z/A cognitive and affective outcomes.

Affect and Curiosity as Intended Zoo and Aquarium Outcomes

Some literature suggests Z/As may elicit natural reflection in- and on-action among their adult visitors. As demonstrated in higher education and workplace studies, there may be an added benefit for Z/As to include more intentional reflective interventions after individual exhibits as a way to support intended visitor outcomes. While conservation behavior is a highly desired outcome of Z/As, the transformation from Z/A experience to PEB change requires exploration into the complex interplay of cognitive and emotional factors, among others (Fraser et al., 2023; Spooner et al., 2023). In light of Z/As mission of enhancing understanding and connection with wildlife, the present study aims to explore this interplay by examining the influence of a reflective intervention on visitor curiosity and positive affect for adult visitors.

Reflection and positive emotional experiences may work together to create an impactful experience that resonates with Z/A visitors (Ballantyne et al., 2011). Many reflective models specifically reference the importance of examining ones' emotions (Boud et al., 1985; Moon, 1999). Furthermore, reflective interventions in higher education work to promote positive affect and affective thought. Indeed, the previous sections of this review provides support that reflective interventions promote positive affect (Chen & Forbes, 2014; Imperato & Strano-Paul, 2021; Shapiro et al., 2006), a primary intended outcome for Z/A visitors (Ballantyne et al., 2011;

Clayton et al., 2009; Luebke et al., 2016; Myers et al., 2004). Ballantyne and Packer (2016) suggest Z/As create similar reflective opportunities that allow visitors to process these emotions and experiences, as such opportunities may translate to eventual conservation support. Therefore, studying positive affect as an outcome seems particularly relevant within a Z/A setting.

In addition to positive affect, curiosity is another key outcome related to reflective interventions and Z/A goals. Curiosity is defined as the motivation to seek out and consume more information than what is already known (Dyche & Epstein, 2011; Kahan et al., 2017). Some argue that this motivation can be driven by the pleasurable desire to learn something new, or as a "feeling of deprivation" stimulated when someone feels they are lacking meaningful information to answer a complex question or solve a tough problem (Litman & Silvia, 2006). Regardless of the motivation, curiosity has been linked to many desirable outcomes in the context of clinical settings, workplace environments, science, and medical education (Kashdan & Silvia, 2009; Reio & Callahan, 2004; Schattner, 2015). Curiosity has been associated with the search for maintainable sources of pleasure and meaning (Kashdan & Silvia, 2009), motivation toward change (Kaczmarek et al., 2013), reflexivity (Trapnell & Campbell, 1999), openness to experience (Connelly et al., 2014) and PEB in both children and adults (e.g., Kim et al., 2012; Warren & Coghlan, 2016) Furthermore, researchers have found that science curiosity can mitigate biased information processing of societal issues, like climate change and vaccinations (Kahan et al., 2017). That is, individuals who are more science curious, were able to overcome personal biases and examine information that challenges their predispositions (Kahan et al., 2017). Taken together, these findings suggest that enhanced curiosity may be linked to openness to new information and eventual behavior change more so than just having strong conceptual knowledge of a topic.

Given the potential of curiosity in driving critical outcomes, some work has sought to understand what gives rise to or supports individuals' curiosity. Some research has highlighted the influence of the setting itself, including research within medical education settings, which has found that environments that allow for mindful reflections of oneself allow curiosity to thrive (Leonard & Harvey, 2007). Comparatively, Kashdan and Fincham (2004) suggest that topics that induce curiosity are largely based on individual differences relative to an individual's interests, expectations, and prior knowledge. Z/A settings may offer unique opportunities that stimulate curiosity among visitors. Clayton et al. (2009) found a positive correlation between visitors wanting to know more about the animals they saw and support for not only those individual animals, but their species as a whole. Taken together, these findings suggest that in relation to conservation and PEB, curiosity can be studied as a dispositional trait, and as an outcome variable that is capable of stimulation via interaction between a person and their environment.

Examining the target of an individual's affective and cognitive (i.e., curiosity) responses is particularly relevant in the context of species conservation. Both within and beyond the Z/A literature, a vast array of studies have examined peoples' perceptions, attitudes, emotions, and actions toward different species. Much of this work has manifested from an interest in better understanding and mitigating human-animal interactions (Pepin-Neff & Wynter, 2018), while others have sought to determine how species' physical and behavioral characteristics differentially influence public attitudes and perceptions (Neves et al., 2021b). Sharks are a particularly fascinating species. Surveys have shown that people are fearful of the species, yet other work suggests that people are curious about and admire the species (Sevillano & Fiske, 2016). Indeed, prior research has sought to understand peoples' curiosity and affective responses

toward sharks as such outcomes may play a role in shark conservation efforts (Lucrezi et al., 2019; Pepin-Neff & Wynter, 2018).

Sharks are one of the oldest living species on the planet and play a critical role in the functioning of marine ecosystems (Dulvy et al., 2021). However, they are also at risk. Decades of overexploitation have significantly declined shark populations and threatened the conservation status of myriad species of sharks (Dulvy et al., 2021). Many scholars and practitioners argue that the success of shark conservation initiatives have, in part, been limited by the species' negative public image (Lucrezi et al., 2019; Pepin-Neff & Wynter, 2018). Indeed, researchers find that while many individuals claim to support shark conservation, they prefer to donate to the conservation efforts of dolphins, an animal that has been shown to elicit less avoidant emotions (e.g., uncomfortable, frightened, threatened; Neves et al., 2021b). Contemporary narratives surrounding sharks, partially informed by the media's portrayal of negative human-shark interactions, have given rise to negative misconceptions and attitudes towards the species. For instance, the 1975 movie "Jaws", a film which popularized the idea of the summer blockbuster, acted as a significant catalyst for increasing human interest in Great White sharks and more problematically, casting most species of sharks in a negative, man-eating light (Neff, 2015; Neves et al., 2021a; Shiffman, 2022). Indeed, Neves and colleagues (2021a) attempted to create a social representation of sharks by asking entering aquarium visitors to write down a few words that come to mind when they see the word "shark." They found that individuals utilize Great Whites, the stars of "Jaws," as a mental prototype of all sharks.

Although sharks are often held in a negative light, other research suggests that people are curious about and express positive attitudes towards the species (Acuña-Marrero et al., 2018; Friedrich et al., 2014; Giovos et al., 2021). A recent global survey representing individuals from

137 countries, finds that global perceptions of sharks are shifting to a more positive view (Giovos et al., 2021) and that a majority of individuals hold factually accurate knowledge about the species. Of the individuals who reported higher factual understanding of the species, 91% credited documentaries for their shark knowledge. Despite "Jaws" role in providing a lasting negative stereotype of sharks, it also contributed to the development of educational outlets, such as the Discovery Channel's "Shark Week," which offers content highlighting and promoting awareness of human-shark interactions as well as issues around declining shark populations. However, literature analyzing how viewers' respond to such programming has revealed mixed findings. On one hand, such content may reinforce negative shark stereotypes, as participants who viewed videos of negative human-shark interactions overestimated their risk of being a victim of a shark attack compared to those who did not watch the videos (Myrick & Evans, 2014). On the other hand, and in the same study, participants also self-reported higher levels of curiosity than feelings of fear, compassion, and anger (Myrick & Evans, 2014). Furthermore, individuals who report more emotional responses to viewing these clips were more likely to seek out more information about sharks after watching the videos. Taken together, direct intervention or programming, such as a reflective prompt, may have a role to play in influencing peoples' curiosity and affective responses toward sharks.

In light of the aforementioned literature, there is initial support to suggest that Z/A visitors engage in natural reflective processes during their visit (Luebke & Matiasek, 2013; Riedinger & Storksdieck, 2023). However, it remains unclear whether and to what extent visitors may differentially reflect given underlying motivations for their visit, among other factors. Additionally, work outside of Z/A settings provides support for the role and potential of reflective interventions in enhancing learning outcomes, in part, by making content more

personally relevant and meaningful to the individual (Chen & Forbes, 2014; Mezirow, 1991; Moon, 1999). While other studies in free-choice learning contexts have tested the impact of a metacognitive intervention (Gutwill & Dancstep, 2017), the explicit use of reflective interventions have yet to be examined and tested in Z/A settings. Thus, the present dissertation sought to address these gaps by focusing on sharks, as the research shows peoples' general feelings toward the species are mixed.

Conceptual Framework

The conceptual framework for the present research is both empirically and theoretically informed, drawing specifically on models of experiential learning and reflective practice. Elements of CML (Falk & Dierking, 2000), Kolb's experiential learning cycle (1984), Boud's experiential learning model (1994), Schön's reflection model (1983), Mezirow's 10 phase model (1991), and Moon's levels of learning (1999) are integrated into the conceptual framework to better understand visitors' relationship with and the potential impact of reflection in Z/A settings. The present conceptual framework features elements related to both the process of reflection in Z/As (i.e., iterative reflective dimensions) and the potential elicitation of deeper levels of reflection through the exhibit space and reflective intervention (i.e., vertical reflective dimensions). While these theories and models have been previously discussed in the literature review, the following section offers a detailed overview of how relevant constructs and elements drawn from these models, and the relationships among them, shape the conceptual framework for the present research (see Figure 1).

The first aspect of the conceptual model integrates the personal context of the CML as well as Boud's experiential learning model (1994). CML defines personal context as an individual's or visitor's prior knowledge, expectations, motivations, interests, beliefs, and

elements of choice and control (Falk & Dierking, 2000). This is similar to an assumption

embedded in Boud's (1994, 2001) experiential learning model, which states that new learning is

always rooted in prior experience and attempts to promote new learning should acknowledge that

prior experience in some way. By extension, Boud's model (1994, 2001) suggests that

individuals reflect in anticipation of a new experience or event. In light of the current work, these

theoretical elements support examining (1) how visitor motivations (e.g., prior knowledge,

expectations, etc.) may differentially impact natural reflection within an aquarium, and (2)

whether and to what extent activating a visitors' prior knowledge and perceptions of an exhibited

species through a pre-visit reflection influences intended outcomes (e.g., reflection before action;

Boud, 1994, 2001).

The second component of the conceptual framework places an emphasis on experiential

learning within the physical setting of the Z/A. According to CML, the physical context includes

the design of the institution, such as the actual exhibit space (Falk & Dierking, 2000). Similarly,

Boud's model (1994) refers to the learner's physical space as the milieu and suggests that it is

within the milieu that individuals become aware of what is happening in and around themselves

(Boud, 1994). Within this aspect of the conceptual framework, iterative and vertical reflective

dimensions converge to help explain the process of reflection within the exhibit space as well as

how an individual's experience within the physical space may elicit varying levels of reflection.

For example, within the iterative dimension, Kolb's experiential learning cycle refers to the

initial awareness of one's surroundings within the physical context as a "concrete experience."

According to Boud (1994) and Schön (1983), individuals will begin initial "in-action"

reflections, where they try to interpret the event as they are experiencing it. Similarly and within

the vertical dimension, Moon (1999) refers to this type of surface-level reflection as "noticing,"

while Mezirow (1991) calls it the presentation of a "disorienting dilemma" or conflict. During this rudimentary level of reflection, individuals create a basic reproduction of ideas, but they are not yet well linked (Moon, 1999). In the present dissertation, the milieu or physical context was the exhibit space, which provided signage and the opportunity to observe various fish species. While this dimension is not directly manipulated or assessed in the present research, previous Z/A literature suggests that this environment may provide the opportunity for concrete experience and initial in-action reflections (e.g., Luebke, 2018; Luebke & Matiasek, 2013; Riedinger & Storksdieck, 2023).

Within the physical context of the CML, visitors engage in various social interactions both within their visiting group and through mediated interactions with staff and volunteers. The CML refers to this as the sociocultural context (Falk & Dierking, 2000). In the present dissertation this involved creating intentional opportunities for visitors to reflect immediately following their exhibit experience. Boud (1994; 2001) refers to this as "return to experience" and Schön (1983) refers to it as "reflection on-action." Conceptualizing reflection in this way (e.g., as an iterative process) suggests that an individual returns to an experience, attends to their feelings about it, and re-evaluates it (Boud 1994, 2001). The final post-exhibit aspect of the conceptual framework more specifically considers the depth of reflection that may be initiated or supported by direct intervention. While vertical reflective models differentially conceptualize levels of reflection, they similarly describe reflection, as previously noted, as having features that encourage either surface or deeper levels of analysis (Mann et al., 2009). The deepest levels of reflection are more analytical, allowing individuals to "make meaning" of the content (Kolb, 1984) by connecting emotions, ideas, and concepts together (Moon, 1999). Kolb (1984) refers to this as a shift from "reflective observation" to "abstract conceptualization," whereas Mezirow

conceives these levels (moving from lower to higher levels) as "thoughtful action," "reflection," and "critical reflection."

Taken together, the present dissertation aimed to examine these relationships relative to a visitor's aquarium experience. Specifically, the research sought to (1) address to what extent visitors naturally reflect and whether differences emerge among visitor types, (2) examine whether and to what extent single or multiple reflective prompts differentially influence cognitive and affective outcomes, and furthermore, (3) assess how and the level at which individuals reflect across single and multiple points of reflective.

Figure 1

Conceptual Framework
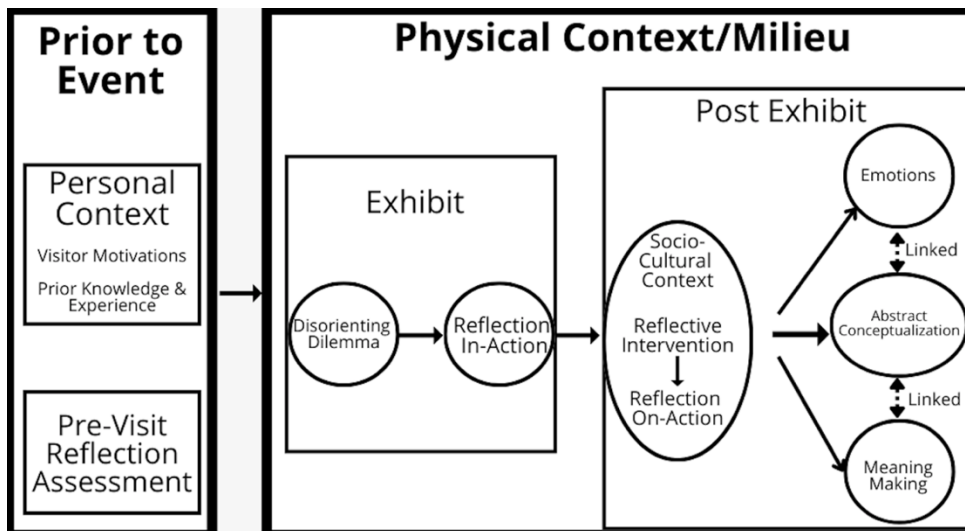
CHAPTER III: METHODOLOGY

Building on prior work both within and beyond the context of Z/As, the present

dissertation aimed to expand our understanding of whether and to what extent aquarium visitors

naturally reflect, and whether the introduction of reflective prompts can influence aquarium

visitors' self-reported curiosity and affect. In this chapter, I detail the methodological approach

to examine my research questions across two studies and describe the study site and species

exhibit selection. Further, I describe how I operationalize reflection and a reflective intervention,

as well as the overall procedures associated with each study.

Study Design and Methodological Approach

The present research examined the role and potential of reflection across two empirical

studies. The first study of my dissertation was an extension of past Z/A research findings, which

find that visitors engage in natural self and group reflection during their visits (Luebke &

Matiasek, 2013; Riedinger & Storksdieck, 2023). Specifically, the first study introduced and

examined how visitor motivation may influence an individual's engagement in natural reflection

during their visit. This is an important variable to consider, as Z/A visitors have been shown to

have different experiences relative to what they do and take away from their experience

depending on their underlying motivation for the visit (Falk et al., 2007; Falk et al., 2008;

Heimlich et al., 2004). The present study aimed to build on Luebke and Matiasek's (2013)

preliminary correlational work, which suggests that reflection in-action occurs within exhibit

spaces and is positively correlated with visitors' cognitive and affective reactions. This study

also took a non-experimental approach and extended prior work by taking into account the five

visitor motivation categories (explorers, facilitators, professionals/hobbyists, experience seekers,

and rechargers/spiritual pilgrims) identified by Falk and colleagues (2007). Specifically, Study 1 aimed to answer the following research question:

1. Do adult aquarium visitors differentially self-reflect depending on their underlying motivations?

In order to examine the aforementioned research question and in relation to prior research, a quantitative non-experimental design was leveraged. This type of research is common not only within free-choice learning environments, but within education research as a whole because there are important non-manipulatable variables that should be explored to further our knowledge in the field of education (Johnson, 2001). Non-experimental research can be further classified as descriptive, predictive, or exploratory (Johnson, 2001). Study 1 can be classified as descriptive non-experimental research, as the primary goal was to expand on Luebke and Matiasek's (2013) findings by describing the relationship between visitor motivations and reflection at a Z/A exhibit. To this end, a quantitative approach allowed the present research to test already established findings from previous work (e.g., visitors reflect naturally in exhibit spaces) with the aim of standardizing data collection for other Z/As and exhibits to test this relationship in future research (Johnson & Onwuegbuzie, 2004). Furthermore, Ballantyne and Packer (2009) claim that quickly collecting large amounts of solely quantitative data in a free-choice learning environment is necessary when the research is at an exploratory and descriptive stage, similar to the present study.

Drawing on models of reflective practice and reflective research, Study 2 sought to understand whether and how providing intentional opportunities to reflect could amplify cognitive and affective outcomes among visitors. Examining the efficacy of reflective interventions is particularly important since prior literature suggests that reflection may not

always occur naturally for some individuals and thus, may need to be prompted or intentionally supported in some way (Cajiao & Burke, 2016; Grant et al., 2002; Silvia et al., 2022; Sobral, 2000). To that end, reflective interventions have been utilized in higher education and business settings to assist with the reflection process and have been shown to enhance intended outcomes, such as positive affect and improved work performance (Imperato & Strano-Paul, 2021; Perusso et al., 2020; Renner et al., 2020). Furthermore, Boud's experiential model (1994, 2001) recognizes that in order to meet intended outcomes, more active reflective engagement is required from the learner before, during, and after an event. However, reflective interventions have yet to be tested in a Z/A setting. The present study sought to address this gap by engaging in a preliminary investigation assessing whether and to what extent reflective interventions influence visitors' affect and curiosity for a specific species. More specifically, the second study of this dissertation aimed to answer the following research questions:

1. Does a reflective intervention in an aquarium setting enhance adult visitors' curiosity and positive affect for sharks?

2. What is the combined effect of multiple reflection points compared to one reflection point on adult visitors' affect and cognitions toward sharks?

In order to examine the efficacy of intentional reflection interventions on participant outcomes as well as assess how and at what level participants reflected, Study 2 incorporated a mixed methods experimental approach. Experimental research design typically involves and allows for the manipulation of variables and random assignment of participants to conditions (Johnson, 2001). Because of their design, which allows for the comparison of a control and experimental group(s), experimental designs can provide evidence for causation (Martella et al., 1999). Research utilizing randomized control experiments is lacking in both Z/A and reflective

intervention literature (Chen & Forbes, 2014; Mann et al., 2009; Mellish et al., 2019). Though, one exemplar Z/A study randomized conditions by hour blocks, exposing zoo visitors to the control and experimental conditions in the morning and afternoon, respectively (Lindemann-Matthies & Kamer, 2006). Study 2, as discussed in greater detail below, utilized a similar procedure, randomly assigning experimental conditions (i.e., pre and post, post only, and control) to three different days of the week.

In light of prior empirical work, reflective models, and the resulting conceptual framework for the present work, two experimental conditions (in addition to the control) were identified for the purpose of Study 2. Specifically, Study 2 sought to address the efficacy and potential differences of reflective interventions occurring once immediately after the exhibit experience (i.e., post only condition) and those occurring both before and immediately after the exhibit experience (i.e., pre and post condition). With respect to the research questions, this enabled a comparison of a single reflection point and multiple reflection points. In the post only condition, participants were asked to respond to a written reflection prompt immediately following their exhibit experience (e.g., reflection-on action). Comparatively, in the pre and post condition, participants received and responded to a written reflective prompt before entering the aquarium and a subsequent written reflective prompt immediately following the exhibit experience. This condition was created based on Boud's experiential learning model (1994, 2001), which is partially embedded in the conceptual framework for the study (See Figure 1). That is, reflection prior to the situation can assist in reflection in and on-action as the learner is presented with information that fits or conflicts with prior assumptions (Boud, 2001).

The rationale for approaching visitors after their exhibit experience instead of during is supported by a recent study across three zoos and three aquariums in the United States

(Riedinger & Storksdieck, 2023). Through observational GoPro footage, researchers discovered that visitor groups engaged in the most meaning making talk after each exhibit. The present study utilized this reinforcing time period to measure natural reflection and implement the reflective intervention.

The selection of a written reflective intervention not only aligns with Boud's theoretical model (2001), but is also the most common type of reflective intervention utilized in practice within higher education (Hägg, 2020; Körkkö et al., 2016; Perusso et al., 2020; Shapiro et al., 2006). For instance, Boud (2001) explains that in the face of a new situation, written reflections help the learner to think about what they bring to the event, and what they want out of it. To that end, journaling and personal blogs have been effective in driving participant outcomes such as enhanced empathy and critical thinking skills (Perusso et al., 2020; Shapiro et al., 2006). Although reflection has been prompted by other mediums and activities (e.g., focus group discussions, etc.), a brief written prompt in the form of a postcard was selected for use in the present study given the time constraints inherent to Z/A research/visitor experience and the practicality of such an approach. Similar techniques (i.e., postcards) have been used previously in Z/A settings. Although reflection was not the main focus, another study conducted within an aquarium utilized free response written postcards to assess visitors' feelings and knowledge toward Marine Protected Areas (Mann-Lang et al., 2023).

The final condition included the control group, who did not receive a reflective intervention. Incorporating a control group addressed another gap within the reflective intervention and Z/A literature, as controlled comparative groups are rarely utilized across research examining the influence of reflection in higher education settings (Chen & Forbes, 2014; Mann et al., 2009) or within many Z/A studies (Mellish et al., 2019).

Study 2 leveraged a quantitative approach to assess the potential impact of treatment conditions on visitors' self-reported curiosity and affect toward the exhibited species. While many reflective models are rooted in behavior change outcomes (Boud et al., 1985; Kolb, 1984; Mezirow, 1991; Moon, 1999), the present study was exploratory in nature, trying to identify a relationship between reflection and deeper emotional and cognitive understandings in a new context, an aquarium. Curiosity and affect were selected as the primary dependent of variables of interest because they are both central to reflective models and to targeted visitor outcomes associated with the selected species, sharks (Friedrich et al., 2014; Neves et al., 2021a).

In addition to the quantitative assessments on curiosity and affect, participants in the pre and post and post only conditions provided qualitative data in the form of their written reflections. There were several reasons why obtaining qualitative data was pursued in this context. Primarily, qualitative data enabled me to assess how and in what ways participants were reflecting and furthermore, to assess the depth or level of reflection at which they were engaging. To that end, qualitative data is common within reflective intervention literature, as the reflections themselves typically emerge from written responses or are transcribed from focus group discussions (Mann et al., 2009). The present study analyzed reflections for overall sentiment (e.g., positive or negative) as well as the specific content and themes visitors chose to reflect upon. Additionally, reflections were analyzed for depth utilizing the REFLECT rubric (Wald et al., 2012), which has established clear criteria to assess the level of a reflection based on Mezirow's critical reflection model (e.g., habitual action, thoughtful action/understanding, reflection and critical reflection; Mezirow, 1991). The rubric has been validated (Daryazadeh et al., 2020) and used in other research studies to evaluate students' reflective writing (Brown et al., 2020).

Although qualitative methods are common across reflective intervention literature, a systematic review of Z/A literature finds that such approaches are underutilized in Z/As settings (Mellish et al., 2019). Thus, the present research also meets the call to incorporate more qualitative research into Z/A work, as this data allows researchers to explore questions in greater depth, further revealing complexities that may not be seen in quantitative analyses (Mellish et al., 2019). Similarly, they suggest more Z/A studies incorporate mixed methods designs in Z/A research, as multiple methods can triangulate results. The next section discusses the aquarium site in which these methods were applied.

Study Site and Exhibit Selection

Jenkinson's Aquarium (JA) is located in Point Pleasant Beach, NJ, a seaside town with a population of about 4,548. JA has been a popular New Jersey tourist attraction for visitors near and far since they opened their doors in June 1991. In 2021, JA welcomed 152,829 adult visitors, introducing them to the Aquarium's mission to enhance marine life education and conservation. JA is accredited by the Association of Zoos and Aquariums (AZA) and participates in many conservation efforts such as AZA's Saving Animals From Extinction (SAFE) programs for sharks, African penguins, and harbor seals. JA also participates in local conservation efforts, such as hosting beach clean ups intermittently throughout the year.

For the purpose of the present study, JA was selected for two key reasons. First, is the aquarium's size (e.g., 200,000 square feet categorized as a small aquarium). Larger aquariums typically have funding and support to design (and re-design) large exhibits and experiences that meet intended visitor outcomes. For example, in April 2022, Monterey Bay Aquarium opened *Into the Deep*, a $15 million, 10,000 square foot exhibit designed to specifically elicit empathy for deep sea invertebrates (Monterey Bay Aquarium, 2022). Smaller aquariums, such as JA,

generally do not have access to resources or the space to (re)design or expand exhibits to further support the visitor's experience. Indeed, aside from some signage changes, a majority of JA's exhibits have not been remodeled since the aquarium opened in June 1991. Instead, they predominantly rely on staff and programming to meet their mission-related outcomes. Thus, small institutions like JA may directly benefit from programmatic interventions like reflective prompts that don't require any substantial resources and/or infrastructural change. The second reason was a matter of convenience, as the aquarium is located in close proximity to the researcher.

Sharks were selected as the exhibited species and data collection took place at JA's 58,000 gallon Atlantic shark exhibit (Appendix A). JA's shark exhibit provides five large viewing windows that allow visitors to observe four different species of sharks as well as two species of stingrays and six species of larger fish. This exhibit also includes two signs with interpretive messaging about shark conservation and fact-based information about their senses. The intended interpretation of the conservation signage is to address misconceptions of sharks and educate visitors about declining populations (e.g., "Sharks should be more afraid of us than we are of them. Every year an estimated 100 million sharks are killed for their fins."). This sign was designed to elicit a range of affective responses from visitors, including empathy (Danni Logue of Jenkinson's Aquarium, personal communication, February 2023). The face-based sign provides information about various shark senses, intended to enhance visitor knowledge about shark behavior. In an effort to gain an understanding if affective and curiosity outcomes were being met from reflections occurring within the natural exhibit space, data was purposefully collected when no staff or programs were occurring at the exhibit. As a smaller aquarium who may not have the capacity to build an entirely new exhibit, this information can be used to make

small updates to signage or to assign volunteers to this space if intended outcomes are not being met.

Study 1

Participants

Since the present research is practically concerned with better understanding and enhancing the adult visitor experience, participants for this study included JA visitors over the age of 18. In order to compare reflection differences among each of the five visitor motivations, the study aimed to recruit 20 participants per visitor motivation, a common target number within the Z/A literature (Schultz & Joordens, 2014; Simmons et al., 2011). In order to obtain a representative sample of JA visitors, data collection was randomized by day of the week and time of day to include both busy and slower visitation times at JA (Table 1). This data collection schedule is common within Z/A research when aiming to obtain a random and representative sample of visitors (Lindemann-Matthies & Kamer, 2006; Joy Kubarek of Inform Evaluation and Research, personal communication, September 2022).

Table 1

Data Collection Schedule for Study 1

Date	Morning (9am-12pm)	Afternoon (2pm-5pm)
Sunday, July 9		x
Monday, July 10	x	
Tuesday, July 11	x	
Saturday, July 15		x
Sunday, July 16	x	x
Monday, July 17	x	
Friday, July 28		x

Materials

Visitor Motivation Question. As past research shows, when visitor motivations are not taken into account, Z/As may seemingly not reach intended outcomes (Falk et al., 2008). Drawing on the work of Riedinger and Storksdieck (2023), and Packer and colleagues (2019), single item categorical statements have been adapted to assess visitor motivations for coming to the Aquarium: (e.g., 'Explorer': I'm here to see and learn about wildlife, 'Facilitator': I'm here to spend time with my family/friends; see Appendix C for full survey). Participants were asked

to select which of these five statements best described their primary reason for visiting the aquarium. Response options were randomized for each participant to avoid order effects.

Reflection Scale. The scale measuring reflection in this study drew on two items from Luebke and Matiasek's (2013) "Introspection/Reflection" subscale and five items from the "Self-reflection and Insight Scale (SRIS)" (Grant et al., 2002). The scale for this study was meant to measure reflection as defined by reflecting on one's past thoughts and feelings in-action and having a metacognitive awareness of such thoughts. Luebke and Matiasek (2013) include aspects in their scale such as spiritual connection and relaxation that were not relevant to the present study. Items that aligned with the goals of the present study, such as "I was reminded of a previous place, experience, or animal" were retained.

The SRIS (Grant et al., 2002) also involves components such as reflection of one's behavior that were excluded as they were not relevant to the present study. Unlike the Introspection/Reflection subscale (2013), the SRIS was not made specifically for Z/A settings. Therefore, the present study adapted items to specifically focus on reflection at the Atlantic shark exhibit (e.g., "It is important to me to try to understand what my feelings mean" was adapted to "It is important to me to try to understand what the feelings brought up by this exhibit mean"). Scale items were randomized for each participant to avoid order effects and were answered on a 7-point scale (1 = *not at all*, 7 = *very much so*).

Demographics. Several demographic questions were asked. Since previous self-reflection research shows limited to no statistically significant difference for age and gender relative to an individual's reflection, these characteristics were not asked in the present work (Loka et al., 2019; Paloniemi et al., 2021; Tricio et al., 2015). The present study asked four demographic questions that have been shown to correlate with certain visitor motivations and in

turn, influence the visitor experience (Falk et al., 2008; Knudson, 2019; Packer & Ballantyne, 2016; Riedinger & Storksdieck, 2023). Specifically, participants were asked to indicate the frequency of visits to Z/As within a year (i.e., 0–1, 2–3, 4–5, more than 5), the length of time spent at the Atlantic shark exhibit (i.e., less than 2 minutes, 2–5 minutes, 5–10 minutes, over 10 minutes), and the number of children under the age of 18 that were present in their group (i.e., open-ended response). Finally, participants were asked to write their email address if they were interested in being entered into a lottery to win one of three $25 Amazon gift cards.

Procedure

Study 1 was approved as "exempt" through Antioch University New England's Institutional Review Board. Data collection took place at JA between July 9, 2023, and July 28, 2023 (See Table 1 for data collection schedule). In accordance with many ZA studies, a "next across the line" approach was used to recruit a non-biased sample (Falk et al., 2007; Luebke et al., 2016; Moss et al., 2010). With this approach, any group consisting of at least one adult was approached once they passed an imaginary line set by the researcher. I informed the group that I was collecting data about their experience at the shark exhibit for the purposes of my dissertation work and asked if one adult member of the group would be willing to take a survey for the chance to be entered into a lottery to win a $25 Amazon gift card. See Appendix B for the informed consent script used to gain consent.

After providing verbal consent, participants were handed an iPad or scanned a QR code using their own device to complete the study. In light of COVID, participants were given the option to take the survey on their preferred device. The iPad or QR code link opened to the survey, which was hosted on Qualtrics, a survey software platform. Participants then completed the visitor motivation question, adapted self-reflection scale, and demographic information via

the Qualtrics survey. Once participants were done with the survey, I thanked them for their time, and wiped down the iPad with a cleaning wipe.

Study 2

Participants

Participants included JA visitors over the age of 18. The researcher aimed to recruit 30 participants per condition to test for statistical significance between the three groups, as this target number has been shown to yield statistical power in other Z/A research (Schultz & Joordens, 2014; Simmons et al., 2011). The same "next across the line" approach was utilized to recruit a non-biased sample. Participants were randomly assigned to one of three conditions (i.e., pre and post, post only, or control) based on the day of data collection (Table 2). That is, all participants that were sampled on the same day were assigned to the same condition. This randomization technique has been utilized in past Z/A research to randomly assign visitors to experimental and control conditions (Lindemann-Matthies & Kamer, 2006).

Table 2

Data Collection Schedule for Study 2

Date	Pre and Post Condition	Post Only Condition	Control Condition
Friday, August 25		x	
Saturday, August 26			x
Sunday, August 27	x		

Note. Data collection on all three days took place between 10am-2pm to account for busy visitation times.

Materials

Pre-Exhibit Reflection Prompt. Participants in the pre and post condition were provided a postcard with the prompt: "Please write a few words or phrases that explain your thoughts and/or feelings toward sharks (See Appendix E for the pre and post reflection postcard prompts)."

Post-exhibit Reflection Prompts. Participants in the pre and post condition and the post only condition received a postcard with the prompt: "Please write a few words or phrases that explain your thoughts and/or feelings toward sharks after seeing them on exhibit today." Past interviews with visitors show that seeing animals up close makes Z/A experiences memorable, but that connecting these experiences to their personal lives is what makes the experience meaningful (Khalil et al., 2023). Therefore, the wording for this prompt was selected to purposefully initiate participants' thoughts about their unique experience at the exhibit, and not their preconceived thoughts of feelings about sharks. The incorporation of thoughts and feelings within the prompt was meant to triangulate responses of each participant with the curiosity and affective subscales.

Curiosity Subscale (Mast et al., 2018). Curiosity was measured utilizing three items from Mast and colleagues' (2018) "Curiosity" subscales, which is taken from a larger scale assessing conservation learning. The curiosity subscale has undergone a two-step validation process at Shedd Aquarium across various exhibits (Mast et al., 2018). An example item is, "I wanted to learn more about the connections between animals and people" (1 = *strongly disagree*, 7 = *strongly agree*). The three items were randomized for each participant to avoid order effects. See Appendix D for the full survey.

Affect Subscale. Participants' affective responses were assessed across several distinct emotions, including fear, excitement, respect/admiration, concern, wonder/awe, sense of connection, love, and compassion (e.g., "to what extent, if at all, did you feel the following emotions toward sharks after this exhibit (1 = *not at all*, 7 = *very much so*). These emotions were first measured in Myers et al. (2004) assessing zoo visitors' emotions toward gorillas, okapis, and snakes. Since this seminal study, these and other emotions have been assessed in dozens of ZA studies measuring visitors' affect toward animals on exhibit and in educational programs (Luebke et al., 2016; Luebke & Matiasek, 2013; Mast et al., 2018; Minarchek et al., 2021; Powell & Bullock, 2014). In the present study, these eight emotions were presented randomly for each participant to avoid order effects.

Demographics. Participants responded to four demographic questions. The first was an open-ended question asking them to estimate how much time they spent at the shark exhibit. The second question asked "How often do you visit zoos, aquariums, and/or nature centers within a year?" with participants choosing from four answer options: 0–1, 2–3, 4–5, more than 5. Participants also answered the same visitor motivation question from Study 1, with response options randomized to avoid order effects. Finally, participants were asked to write their email address if they were interested in being entered into a lottery to win one of six $50 Amazon gift cards.

Procedure

Study 2 was approved via "exempt" status through Antioch University New England's Institutional Review Board. Data collection took place at JA on August 20, August 25, and August 27, 2023. Data collection for each of the three conditions was randomized by day with the final order being: control condition, post only condition, pre and post condition. Data

concluded once 30 participants were recruited for the condition of that day. Participants in all three conditions filled out the same Qualtrics survey that included the curiosity and affect subscales as well as the demographic information. In addition to the items on each subscale being randomized, the curiosity and affect subscales were also presented randomly to each participant to control for order effects.

Control Condition. The control condition for Study 2 followed the same procedures as Study 1. I approached every group containing at least one adult as they left the shark exhibit. I introduced myself and the study and gained verbal informed consent the participating adult (see Appendix B for script). Participants were either handed the iPad opened to the Qualtrics survey or they scanned a QR code on their own device. Some participants approached me first after seeing the iPad handed to other participants. For these individuals, I followed the same procedures for introducing myself and gaining verbal consent after I was approached.

Post Only Condition. For the post only intervention, a table was set up after the shark exhibit with a large poster reading "What comes to mind when you think about sharks? Come share your response for a chance to win 1 of 6 Amazon gift cards!". Some individuals approached the table on their own, but during slower times at the aquarium I directly approached individuals and recruited them to participate in the study. Individuals over the age of 18 were asked to fill out a postcard, which included the post-exhibit reflection prompt. After they dropped their card in a box, I handed them an iPad opened to the Qualtrics survey or allowed them to scan a QR code using their own device. At the table, I also provided stickers and coloring sheets to entertain any children of adult participants. During data collection, I kept descriptive field notes, noting participants' behaviors and conversations regarding the intervention with their social group.

Pre and Post Condition. During data collection, a research assistant was stationed at the entrance of the aquarium, next to the box office. The set up included a small table with the same poster utilized for the post only condition. Once individuals approached the table, the research assistant explained the study, and obtained verbal informed consent. Next, participants filled out a postcard with the pre-exhibit reflection prompt and placed it in a box. Adults were then given a large yellow smiley face sticker as a tracking tool, while kids were given smaller shark stickers to thank them for their patience while their adults filled out the postcard. I, the primary researcher, was stationed in the same location (i.e., at the end of the Atlantic shark exhibit) as the post only condition, with the same exact set up. Most individuals who participated in the pre-exhibit reflection approached the table, while I had to keep an eye out for others wearing the smiley stickers and invite them over to the table. The table had sticker and coloring activities for the kids, while the adults filled out another postcard with the post-exhibit reflection prompt. After they dropped their card in a box, I handed them an iPad opened to the Qualtrics survey or allowed them to scan a QR code on their own device. I also kept researcher notes noting the conversations between the adults and children of each group.

General Design Limitations for Studies 1 and 2

It is necessary to discuss some inherent tensions and potential limitations present within the current research. The first considers the temporal aspect of the reflective intervention occurring immediately after the experience. Reflective interventions have mainly been examined for their impact over the course of many months (Imperato & Strano-Paul, 2021; Luo et al., 2019; Perusso et al., 2020; Renner et al., 2020; Shapiro et al., 2006; Sobral, 2000). For instance, while some of these interventions occurred within a social group (Imperato & Strano-Paul, 2021; Sobral, 2000), most are solitary in nature, requiring individuals to iteratively keep personal

reflective journals or essays over the length of a school semester, typically around 3–4 months

(Hägg, 2020; Körkkö et al., 2016; Perusso et al., 2020; Shapiro et al., 2006). Conversely, Z/As

are recreational activities, typically enjoyed with a social group over the course of only a few

hours (Khalil et al., 2023). Thus, one of the primary challenges and potential limitations

concerning the present studies was whether a reflective prompt would be effective or robust

enough in a more ephemeral, social environment. To this end, it is possible that even when

prompted, participants did not reflect as deeply as they would in other settings for a handful of

reasons (e.g., the aquarium is crowded and/or noisy, they are trying to rejoin their social group as

quickly as possible, etc.).

The present study aimed to study reflective models in a free-choice learning environment

due to their relationship with transformative learning outcomes and behavior change. However,

the behavior change component of these models (Boud et al., 1985; Kolb, 1984; Mezirow, 1991;

Moon, 1999) is not reflected in the conceptual framework. Since this is the first study to test a

written reflective intervention and its benefits in a Z/A setting, methodological considerations

were placed on implementing and testing the conceptual framework with a focus on one exhibit

and species. Therefore, the limited scope of these reflective models act as another limitation in

this exploratory study.

Additionally, to initiate self-reflection, participants who agreed to participate had to

spend time away from their social group to complete the study. In order to ensure participants

devoted most of this time to the reflection, shortened surveys were utilized and many general

visitor demographic questions that were not as relevant to the specified research questions were

omitted. Therefore, while data collection was designed to gather a representative sample of JA

visitors, it remains unclear whether the sample was representative of age, education, ethnicity,

and socioeconomic status. This is a limitation within the broader scope of this study, as AZA's most recent social science agenda places a focus on striving for environmental and social justice (Kubarek et al., 2023). Future reflective intervention research may want to not only collect more demographic data to ensure these outcomes are being met, but also schedule data collection on discounted and free days to ensure the sample is more representative.

CHAPTER IV: RESULTS

In this chapter, I report the results from Studies 1 and 2. Study 1 examined whether and to what extent JA visitors naturally reflect during a visit. Specifically, Study 1 examined the influence of visitor motivations on reflection by addressing my first research question:

1. Do adult aquarium visitors differentially self-reflect depending on their underlying motivations?

Study 1 utilized a quantitative approach, leveraging self-report measures to assess participants' motivation for visiting the aquarium as well as their experience with reflection on site. Building on this work, Study 2 utilized a mixed methods approach to test the effectiveness of reflective interventions (e.g., pre and post, post only) on visitors' curiosity and affect towards the exhibited species (i.e., Atlantic sharks). Study 2 aimed to answer the following research questions:

2. Does a reflective intervention in an aquarium setting enhance adult visitors' curiosity and positive affect for sharks?

3. What is the combined effect of multiple reflection points compared to one reflection point on adult visitors' affect and cognitions toward sharks?

To specifically address these questions, participants were assigned to one of three conditions (i.e., control, pre and post condition, post only condition). Across all conditions, participants responded to quantitative self-report items measuring levels of curiosity and affect. In the intervention conditions, participants also provided brief written reflections to the intervention prompt, which served as the qualitative data for the study. This chapter describes both the quantitative and qualitative analytical approaches used to examine the data and reports the findings for each study. Results from these studies reveal initial insights into the role and application of reflection in aquarium settings.

Study 1

Participant Demographics

A total of 119 participants completed Study 1. Table 3 provides a breakdown of participants' self-reported motivation for visiting as well as the other demographic items. Facilitators were the most common visitors (44.5%) whereas experience seekers were the least abundant visitor type (8.4%). Additionally, 49.6% of participants reported that their visiting group consisted of both adults and children, with 46.2% of groups consisting of only adults. A majority of participants report visiting zoos, aquariums, and/or nature centers 2–3 times per year (37.8%), with a similar amount visiting 0–1 times per year (34.5%). Finally, most participants spent over 10 minutes at the shark exhibit (42.9%), with very limited participants reporting spending less than 2 minutes at the exhibit (1.7%).

Reflection Scale Results

A composite measure using the unweighted average of participants' responses to the 7–item reflection scale was calculated. Cronbach's alpha coefficient of internal consistency was calculated to demonstrate how the items hung together statistically (Cronbach, 1951). The Cronbach's alpha for the 7– item composite measure was 0.88, indicating a high degree of internal consistency among participants' ratings. Participants overall reflection scores measured above the scale midpoint ($M = 4.96$, $SD = 1.46$). See Table 4 for item intercorrelations and descriptive statistics.

Table 3

Frequencies of Visitor Demographic Data for Study 1

Variable	*n*	*%*
Visitor motivation		
Facilitator	53	44.5
Hobbyist	20	16.8
Explorer	19	16.0
Recharger	17	14.3
Experience seeker	10	8.4
Group composition		
Adults and children	59	49.6
Adults only	55	46.2
Alone	1	0.8
No response	4	3.4
Annual visitation		
0–1 time	41	34.5
2–3 times	45	37.8
4–5 times	14	11.8
Over 5 times	14	11.8
No response	5	4.2
Exhibit dwell time		
Less than 2 minutes	2	1.7
2–5 minutes	23	19.3
5–10 minutes	40	33.6
Over 10 minutes	51	42.9
No response	3	2.5

Table 4

Reflection Scale Ratings: Item Intercorrelations and Descriptive Statistics

Scale item	1	2	3	4	5	6	7	M	SD
I spent time examining my feelings.	-	0.50	0.52	0.62	0.42	0.59	0.54	4.02	2.11
I was reminded of a previous place, experience, or pet.		-	0.52	0.43	0.47	0.37	0.43	4.89	2.00
I found myself reflecting on new ideas about animals and their environments.			-	0.56	0.53	0.43	0.50	5.34	1.78
I took time to reflect on my thoughts.				-	0.53	0.53	0.60	4.44	2.09
I thought about the way I feel about animals.					-	0.53	0.54	5.82	1.68
It is important to me to understand the feelings this exhibit raised for me.						-	0.83	5.06	1.89
It is important to me to understand the thoughts this exhibit raised for me.							-	5.03	1.82

ANOVA and Kruskal-Wallis Tests

To test the influence of whether and to what extent participants' composite reflection scale scores varied as a function of different demographic variables (e.g., visitor motivation, time spent at shark exhibit, and frequency of annual Z/A visitation), a series of one-way between subjects ANOVAs and Kruskal-Wallis tests were carried out. A QQ plot revealed that visitor motivation data met the normal distribution assumption required to carry out an ANOVA. Therefore, an ANOVA tested the primary research question for Study 1, and found a significant

effect of visitor motivation on reflection $F(4, 114) = 3.81$, $p = .006$. Post-hoc comparisons, using the Tukey test, revealed that hobbyists ($M = 5.71$, $SD = 0.96$) reflected significantly more than facilitators ($M = 4.50$, $SD = 1.58$, $p = .01$). No other statistical differences were observed among visitor motivation types. Table 5 shows means and standard deviations for reflection as a function of visitor motivation.

QQ plots revealed a slightly skewed distribution of exhibit dwell time and annual visitation data. Therefore, Kruskal-Wallis, a nonparametric test for when the assumptions of a one-way ANOVA are not met (Kruskal & Wallis, 1952), was more appropriate to test the effects of these demographic variables on reflection. A significant effect was found with respect to the length of participants' shark exhibit visit on reflection $H(2) = 12.47$, $p = 0.002$. Post-hoc comparisons revealed a significant difference in reflection scores between those who spent 2–5 minutes at the exhibit ($M = 4.25$, $SD = 1.30$) compared to those who reported spending over 10 minutes at the exhibit ($M = 5.45$, $SD = 1.29$, $p = .001$). Due to insufficient variation, respondents reporting that they spent less than 2 minutes in the shark exhibit ($n = 2$; $M = 3.64$, $SD = 0.30$) were not included in the Kruskal-Wallis analysis. Finally, a Kruskal-Wallis test revealed no significant effect of annual Z/A visitation on reflection scores $H(3) = 3.00$, $p = 0.391$. Table 5 shows the descriptive statistics for both time spent at the shark exhibit and annual Z/A visitation on reflection scores.

Table 5

Mean Reflection Scores by Visitor Motivation, Annual Visitation, and Exhibit Dwell Time

Variable	*M*	*SD*
Visitor motivation		
Facilitator	4.59	1.58
Hobbyist	5.71	0.96
Explorer	5.38	1.46
Recharger	4.82	1.15
Experience seeker	5.55	1.37
Annual visitation		
0–1 time	5.17	1.31
2–3 times	5.08	1.55
4–5 times	5.06	1.36
Over 5 times	4.45	1.57
Exhibit dwell time		
Less than 2 minutes	3.64	0.30
2–5 minutes	4.25	1.30
5–10 minutes	4.97	1.53
Over 10 minutes	5.45	1.29

Study 2

Quantitative Analyses

Participant Demographics. A total of 95 participants completed the second study, including approximately equal participants in each of the three conditions: control ($n = 33$), pre and post condition ($n = 32$), and post only condition ($n = 30$). Table 6 provides a breakdown of participants' self-reported motivation for visiting as well as the other demographic items. Visitor motivation breakdown was similar to Study 1, with facilitators being the most plentiful

motivation type (54.8%) and experience seekers being the least common (7.5%). Annual Z/A

visitation was also similar to Study 1, with a majority of participants visiting 2–3 times per year

(50.5%), and fewest participants reporting visiting 4 or more times per year (21.5%).

Participants also responded to a question gauging the amount of time spent in the shark

exhibit. However, in comparison to Study 1, participants responded to an open-ended question in

Study 2, resulting in a continuous variable for time spent in the exhibit ranging between 3 to 60

minutes ($M = 16.87$, $SD = 13.78$, Median $= 10.00$). When this item was parsed for those

estimating below 10, 10, or above 10 minutes at the exhibit, similar patterns to Study 1 emerged

with the majority of participants estimating they spent more than 10 minutes at the exhibit

(47.5%). Fewer participants reported spending less than 10 minutes at the exhibit (25.9%). Table

6 provides more information on frequencies of participant time spent in the exhibit.

Curiosity Scale Results. A composite measure using the unweighted average of

participants' responses to the 3–item curiosity scale was calculated. The Cronbach's alpha for the

3–item composite measure was 0.89, indicating a high degree of internal consistency among

participants' ratings. Participants reported overall curiosity scores above the scale midpoint

($M = 5.51$, $SD = 1.15$). See Table 7 for item intercorrelations and descriptive statistics.

Table 6

Frequencies of Visitor Demographic Data for Study 2

Variable	*n*	%
Visitor motivation		
Facilitator	51	54.8
Hobbyist	16	17.2
Explorer	9	9.7
Recharger	9	9.7
Experience seeker	7	7.5
No response	1	1.1
Annual visitation		
0–1 time	25	26.9
2–3 times	47	50.5
4–5 times	9	9.7
Over 5 times	11	11.8
No response	1	1.1
Exhibit dwell time		
Less than 10 minutes	24	25.9
10 minutes	23	24.7
Over 10 minutes	44	47.5
No response	2	2.2

Table 7

Curiosity Scale Ratings: Item Intercorrelations and Descriptive Statistics

Scale item	1	2	3	*M*	*SD*
I am interested in seeking out more information about sharks.	-	0.70	0.75	5.53	1.24
I wanted to learn more about the connection between sharks and people.		-	0.77	5.52	1.29
I wanted to learn more about what else I can do to help sharks			-	5.49	1.27

Descriptive Statistics and ANOVA Analyses. Descriptive statistics, including the mean and standard deviations, of participants' curiosity and affective responses across the three conditions are presented in Table 8. Descriptively, participants in the control condition expressed the lower levels of fear ($M = 2.39$, $SD = 1.93$), and higher levels of curiosity ($M = 5.70$, $SD = 1.35$), excitement ($M = 6.00$, $SD = 1.26$), respect/admiration ($M = 6.26$, $SD = 1.06$), wonder/awe ($M = 6.13$, $SD = 1.31$), sense of connection ($M = 4.32$, $SD = 1.94$), love ($M = 5.48$, $SD = 1.71$), and compassion ($M = 5.77$, $SD = 1.56$) when compared to the two reflection conditions. The post only condition expressed slightly higher concern for sharks ($M = 4.30$, $SD = 2.23$) than the control condition ($M = 4.16$, $SD = 2.37$), with the pre and post group intervention condition expressing the lowest concern ($M = 3.81$, $SD = 2.16$).

A series of one-way ANOVAs were carried out to explore whether and to what effect the three conditions influenced participants' self-reported curiosity and emotions. No main effect was found on participants' curiosity or affective responses across the ANOVA analyses. Table 9 provides df, *F* statistics, and *p* values for each analysis.

Table 8

Curiosity and Eight Target Emotions: Descriptive Statistics per Condition

Variable	Control		Pre and post condition		Post only condition	
	M	SD	M	SD	M	SD
Curiosity	5.70	1.35	5.32	1.17	5.53	0.92
Fear	2.39	1.93	2.97	2.07	3.20	1.90
Excitement	6.00	1.26	5.69	1.77	5.70	1.51
Respect/admiration	6.26	1.06	6.22	1.31	6.17	1.42
Concern	4.16	2.37	3.81	2.16	4.30	2.23
Wonder/awe	6.13	1.31	5.91	1.51	6.03	1.43
Sense of connection	4.32	1.94	4.03	1.93	4.23	1.98
Love	5.48	1.71	5.03	1.99	5.00	1.98
Compassion	5.77	1.56	5.16	1.85	5.17	1.86

Table 9

ANOVA Results for Curiosity and Eight Target Emotions

Dependent variable	df	F	p
Curiosity scale	2, 92	1.33	0.269
Fear	2, 90	1.39	0.255
Excitement	2, 90	0.41	0.662
Respect/admiration	2, 90	0.04	0.961
Concern	2, 90	0.39	0.680
Wonder/awe	2, 90	0.20	0.823
Sense of connection	2, 90	0.19	0.830
Love	2, 90	0.63	0.536
Compassion	2, 90	1.25	0.292

Qualitative Analyses

The two reflective intervention conditions (i.e., pre and post, post only) yielded written qualitative data in the form of participants' responses to the reflective prompts. Participants' responses from the postcards were manually inputted into an Excel sheet. For the pre and post condition, participant responses to the pre-exhibit prompt ($n = 46$) were inputted separately from the post-exhibit responses ($n = 36$). This was done in order to isolate the meaning and effect of what Boud's (2001) model refers to as "reflection prior to action" and "reflection-on action," and furthermore, enable the examination of how multiple opportunities to reflect may shape visitors' experience. Participants' responses from the post only condition ($n = 32$) were also inputted into a separate tab.

Qualitative analyses of participants' written responses to the intervention prompts (i.e., pre and post, post only) were conducted across three stages, including a sentiment analysis (Ain et al., 2017), content analysis (Bengtsson, 1995), and reflection analysis (Brown et al., 2020; Wald et al., 2012). Performing these separate analyses allowed for a deeper and broader assessment of the primary research questions, which included an exploratory assessment of the level at which visitors' reflected. Inductive and deductive qualitative analytical approaches were leveraged (Azungah, 2018). A deductive qualitative approach involves having an a priori "start list" of codes in anticipation of core concepts within the data (Bradley et al., 2007; Miles & Huberman, 1994). These codes tend to be grounded in prior literature and/or theoretical or conceptual frameworks that are driving the inquiry (Miles & Huberman, 1994). An inductive qualitative approach involves detailed reading and analyzing of the data without predetermined categories or codes. Instead, the researcher allows the data to guide the identification of

emerging patterns, themes, and concepts (e.g., codes) relative to the research (Bradley et al., 2007; Curry et al., 2009; Thomas, 2006).

A deductive approach was used to conduct both the sentiment and reflection analyses, while a mixed deductive and inductive approach was utilized for the content analysis. For all qualitative analyses, two raters, including myself, independently coded participants' responses across the three qualitative analyses. The use of one or more independent coders is common in qualitative work, as it aims to strengthen the credibility of qualitative data analysis (Barbour, 2001; Campbell et al., 2013; Olson et al., 2016). Interrater reliability is also strongest when clear guidelines are established prior to coding (Azungah, 2018). In the present study, the raters independently coded all three sets of responses for the sentiment analysis then met to come to agreement on the assignment of all codes. The same process was followed for the content analysis. Since I was more familiar with the reflection literature, I held a meeting with the second coder to explain the REFLECT rubric (Wald et al., 2012) prior to coding responses independently. After this meeting, the researchers followed the same process as the sentiment and content analyses.

Sentiment Analysis. Sentiment analysis is used to quantify public attitudes toward a particular topic (Becken et al., 2017; Jiang et al., 2015). The process involves assigning sentimental value (usually in the form of positive or negative associations) to words and/or comments used to describe the topic of interest (Ain et al., 2017). Since sentimental analyses tend to be concerned with sentimental expressions ranging from positive to negative (including neutral), most approaches fall within a deductive lens (Ain et al., 2017; Kydros et al., 2021). This means that the data is organized based on pre-existing themes: positive, negative, and neutral.

The addition of a mixed category has been added in some studies observing mixed sentiments within responses (Kydros et al., 2021).

While much research leveraging sentiment analysis is nested within culturomics (Aydoğan & Akcayol, 2016), it has recently been utilized within conservation literature (Lennox et al., 2020). For instance, sentiment analysis was used to analyze abstracts of articles in conservation-related journals between 1999 to 2017, finding that abstracts mentioning lobe finned fishes had significantly higher positive sentiment scores than those mentioning elasmobranchs (i.e., sharks and rays; Lennox et al., 2020). They suggest that sentiment analysis may be a useful tool to understand the narrative of certain species, and if needed, make changes to the narrative as a means to garner greater conservation support. The present study performed a sentiment analysis to compare JA's visitors' thoughts and feelings toward sharks upon entering the aquarium to after their experience at the shark exhibit. Additionally, a key research question of Study 2 was to examine the influence of multiple reflection points (i.e., prior to the exhibit and after the exhibit) compared to singlet reflection point (i.e., post-exhibit). Therefore, the sentiment analysis allowed for a comparison of thoughts and feelings toward sharks between post-exhibit responses of the pre and post condition and the post only condition.

For the purposes of the present study and in line with work leveraging sentiment analysis, participants' responses were coded into four categories: positive, neutral, negative, and mixed. In the present study, myself and the second coder observed the data and noticed many mixed responses such as, "dangerous, but beautiful." Thus, participants' responses that expressed similar tensions within a single clause were coded as mixed. It should also be noted that participants' responses could be separated into multiple sentiments. That is, distinct and separate clauses from participants' overall response could be coded into separate sentiment categories,

resulting in more coded information than actual participant responses (i.e., submitted postcards). For example, one individual's response of "scary; most are smaller than I thought they would be; cool" was coded as negative, neutral, and positive sentiments, respectively.

After coding each participants' response, the frequency of each sentiment across the three reflection points was examined. Across all three reflection points, positive sentiments were the most plentiful. The pre-exhibit reflection contained more negative sentiments than both post-exhibit conditions. Responses coded as mixed typically involved some level of acceptance or even a positive sentiment toward sharks, while still expressing fear or nervousness toward them. These statements were especially present in the pre-exhibit and the post-exhibit responses. Table 10 provides frequencies of each sentiment per condition, along with representative quotes for each sentiment. Appendix F provides additional examples of quotes within each sentiment.

In order to test for significant relationships between the frequency of sentiment expressions between reflection points, a series of Chi-Square Tests of Independence were conducted. Chi-Square tests are designed to test for differences between observed and expected data and whether that difference is due to chance or due to a relationship between the variables under study (McHugh, 2013). To perform the Chi-Square tests, it was necessary to transform the qualitative data into binary/dichotomous codes (Machado & Nahar, 2023). Quantifying qualitative data (transformation of coded qualitative data into numerical format) is common practice in qualitative analyses (Cabrera & Reiner, 2018; Collingridge, 2013; Fofana et al., 2020). In order to quantify the data, each row of data entered into SPSS represented one coded sentiment (e.g., "love them!") and was further identified by the participant's condition (i.e., 1 = pre-exhibit responses of the pre and post condition, 2 = post-exhibit responses of the pre and post condition, 3 = post-exhibit responses of the post only condition) and the coded sentiment

(1 = sentiment preset, 2 = not present). With quantified data, it is common to prescribe such

dichotomized codes before running appropriate inferential statistical tests (Cabrera & Reiner,

2018; Onwuegbuzie & Wilson, 2003). To run the Chi-Square tests, conditions were input into

"rows" section, and each sentiment (positive, neutral, negative, mixed) was input into the

"column" section to produce four separate tests for each sentiment. See Table 11 for an example

of how the data was entered into SPSS.

Table 10

Sentiment Analysis Codes per Reflection in Each Condition

Sentiment	Pre-exhibit (Pre and post)	Post-exhibit (Pre and post)	Post-exhibit (Post only)	Representative quotes
Positive	35	33	46	*"love sharks!"* *"beautiful creations"* *"liked seeing different types of sharks"*
Neutral	19	14	19	*"they eat fish"* *"good smell senses"* *"diverse"*
Negative	20	6	10	*"Jaws scarred me for life!"* *"afraid of them"* *"intimidating"*
Mixed	6	6	1	*"I like them from afar"* *"still scary, but cool!"* *"as long as I don't get bit, I'm ok with their existence"*

Table 11

Example of Dichotomous Sentiment Codes in SPSS Data View

Condition	Positive sentiment	Neutral sentiment	Negative sentiment	Mixed sentiment
1	1	0	0	0
2	0	1	0	0
3	0	0	1	0

Note. Row 1 represents an example of a positive sentiment in the pre-exhibit responses of the pre and post condition. Row 2 represents an example of a neutral sentiment in the post-exhibit responses of the pre and post condition. Row 3 represents an example of a negative sentiment in the post only condition.

The first Chi-Square assessed whether there were differences in expected versus observed sentiment expressions of participants in the pre and post condition (e.g., comparing their pre-exhibit reflections and post-exhibit reflections). Given the transient nature of a Z/A experience, the study design did not include a systematic way to track participants' pre- and post-exhibit responses in the pre and post condition. Thus, the assumption of independent samples required for the Chi-Square test was not violated. The test revealed a significant association between pre and post reflections and negative sentiments $\chi^2(1, N = 139) = 4.91$, $p = .027$. Frequency data provides more insight into this association by revealing more negative sentiments were made in the pre-exhibit reflection ($n = 20$, 14.39%) than in the post-exhibit reflection ($n = 6$, 4.32%). The effect size for this finding, *Phi*, was small, $\Phi = -0.19$.

Another series of Chi-Square Tests of Independence were calculated to observe for associations between respondents' post-exhibit responses. Mixed sentiments were the only reflections to yield a significant association $\chi^2(1, N = 135) = 5.30$, $p = .021$. Frequency data provides more insight into this association by revealing more mixed sentiments were made in post reflections of the pre and post condition group ($n = 6$, 4.44%) than in the post only condition group ($n = 1$, 0.74%). The effect size for this association was also small, $\Phi = -0.198$.

Content Analysis. Previous research has combined sentiment and content analyses to complement each other. For example, studies assessing Tweets during the COVID-19 pandemic utilized a sentiment analysis to examine overall emotion during this time, followed by a content analysis to identify common themes among the sentiments (Berkovic et al., 2020; Kydros et al., 2021). The present study took a similar approach, performing a content analysis to gain a better understanding of the types of comments participants were making with respect to Atlantic sharks and their overall experience. In light of prior literature examining individuals' perceptions and attitudes towards sharks, a deductive approach was utilized to identify two primary superordinate themes: cognition and affect. Specifically, prior work shows that individuals have both strong knowledge of and curiosity toward sharks (Friedrich et al., 2014; Giovos et al., 2021), along with strong feelings toward them (Giovos et al., 2021; Neves et al., 2021a). A deductive approach also allowed me to maintain focus on core outcomes of interests (e.g., curiosity/cognition and affect). Within each superordinate theme, subordinate themes that aligned with past research were also identified. For example, the research finds a strong mix of positive, negative, and mixed emotions toward sharks (Giovos et al., 2021; Neves et al., 2021a). Therefore, positive affect, negative affect, and mixed affect acted as subordinate categories within the affect theme, which parallel the sentiment analysis.

Subsequent to this process, an inductive approach was used to identify emerging themes that did not fit into the five original subordinate themes (i.e., positive affect, negative affect mixed affect, shark knowledge, shark features). Thus, during this stage of the coding process, coding shifted to being data-driven, using an inductive approach to generate additional themes that emerged directly from participants' responses. Incorporating both deductive and inductive approaches can reduce the possibility of the researcher forcing a predetermined hypothesis

(Bradley et al., 2007; Braun & Clark, 2006). During the emergent coding process, two additional subordinate themes emerged within the broader affective theme, including "perceptions," and "curiosity." One additional subordinate theme arose within the cognitive superordinate theme, which was labeled as "new knowledge." To minimize personal biases in the creation of these themes, the second coder, with no personal connection to the present dissertation, coded the data according to all eight themes (Smith & Noble, 2014). A comparative analysis was utilized after they coded the data, with both raters coming to an agreement on the themes and all assigned codes. Tables 12 and 13 provide the frequency of codes for each theme per condition within the affective and cognitive superordinate codes, respectively. Each table also includes representative quotes for each subordinate theme. To note, the same process for coding participant responses was followed. That is, distinct and separate clauses from participants' overall response could be coded into separate content themes, resulting in more coded information than actual participant responses (i.e., submitted postcards). For example, one participant stated: "love them; big" which was separated into the positive affect and shark features themes, respectively.

Overall, more codes fell within the affective superordinate theme ($n = 127$) than the cognitive superordinate theme ($n = 78$). Within the affective theme, most responses fell within positive affect, which was similar to the sentiment analysis. The words "love," "like," "cool," and "amazing" commonly appeared within this theme. When phrases or sentences were coded, the two raters coded the verb of the sentence to place it into a theme. For example, "my daughter likes the teeth" was coded as positive affect instead of shark features, because the respondent highlighted and emphasized a positive attitudinal (affective) expression (i.e., "likes") when referring to shark teeth. The same standards were held for negative affective coding. The most common negative sentiments were "scary," "intimidating," and when respondents indicated

some form of avoidance to sharks or the ocean (e.g., "still nervous if near them"). A few

negative affective codes included participants expressing sadness that sharks are killed for their

fins and furthermore, noted being upset by animals being held in captivity. The mixed affect

theme was created because, similar to the mixed code in the sentiment analysis, many

participants provided a sentence or phrase that included both an acceptance or appraisal of sharks

paired with expressions of fear or apprehension (e.g., "amazing; scared if they would bite me

though").

Participants tended to provide responses mentioning public misperceptions of sharks, and

a need for humans to respect the species. This led to the emergent "perceptions" theme within

the affective parent code. As seen in Table 12, more responses fell within this theme than the

mixed affect or newly emergent "curiosity" theme. Although the least codes fell within the

curiosity theme, responses were distinct enough to justify the creation of this theme in which

participants indicated a fascination or interest in sharks.

Due to the nature of the reflective prompt (i.e., "Please write a few words or phrases that

explain your thoughts and/or feelings toward sharks."), many participants responded by

describing general facts about or physical features of sharks. The shark knowledge theme mainly

included general shark facts including their role in the ecosystem or mentions of their super

senses. However, this theme was labeled shark knowledge and not shark facts because many

other participants responded by providing popular culture references such as Jaws, baby shark,

and Finding Nemo. Responses coded within shark features included objective responses referring

to their teeth and big size as well as subjective responses such as "beautiful." Furthermore,

participants' post-exhibit reflections (both pre and post condition and post only condition)

indicated new knowledge gains (e.g., "most are smaller than I thought they would be"), resulting

in the creation of the new knowledge theme. While some of the general facts presented by participants referred to signage at JA (e.g., sign on shark senses and conservation signage referring to how many sharks are finned per year) they did not fall into this code because participants did not indicate or use language to suggest if they had learned those facts during their visit. Instead, responses in the new knowledge theme explicitly indicate that new knowledge was acquired. As the purpose of the content analysis was to supplement sentiment and reflective analyses, no inferential statistics were performed with these superordinate and subordinate themes.

Table 12

Subordinate Themes within Affective Superordinate Theme: Frequency per Condition and

Representative Quotes

Sub affective themes	Pre-exhibit (Pre and post)	Post-exhibit (Pre and post)	Post-exhibit (Post only)	Representative quotes
Positive affect	20	18	16	*"Amazing animals"* *"I love sharks and their teeth"* *"Really cool that to sleep only half of their brain shuts off so they can still swim"*
Negative affect	17	6	8	*"Afraid of them biting"* *"They honestly scare me!"* *"Sad they are so misunderstood"*
Mixed affect	3	7	0	*"dangerous, but beautiful"* *"love them, but also still afraid"* *"very graceful, but don't want to swim with them"*
Perceptions	8	6	11	*"People are more afraid of sharks than they should be"* *"Unique species that should be protected"* *"Can be dangerous, but only when antagonized by people. They're just trying to survive and do what they naturally do."*
Curiosity	2	1	4	*"My granddaughter could watch them all day"* *"Excited to see them"* *"Interesting species from great whites to hammerheads"*

Table 13

Subordinate Themes within Cognitive Superordinate Theme: Frequency per Condition and

Representative Quotes

Sub cognitive codes	Pre-exhibit (Pre and post)	Post-exhibit (Pre and post)	Post-exhibit (Post only)	Representative quotes
Shark knowledge	15	10	17	*"They help the oceans by keeping the food chain running"* *"Overfish of sharks is a real concern as up to 100 million sharks are fished each year"* *"When sharks sleep half their brain turns off, and they keep swimming"*
Shark features	11	7	13	*"Black Tip Reef Sharks were creepy looking!"* *"velvety looking"* *"they have a lot of teeth"*
New knowledge	0	2	3	*"I didn't know there were so many sharks that 100 million could ever be available to kill for fins"* *"Most are smaller than I thought they would be"* *"I learned a lot more about sharks!"*

Reflection Analysis. The final qualitative analysis aimed to assess the level or depth of

reflection participants engaged in relative to their written responses. This analysis directly

aligned with the conceptual framework for the study, integrating the iterative (process driven)

and vertical (depth) dimensions of reflective and experiential learning theory. According to

Mezirow (1991), individuals respond to a "disorienting dilemma" or conflict through four

varying levels of reflection. When assessed within reflective writing, the first level, habitual

action, involves no reflection at all, and is primarily identified in reflective writing as basic fact

reporting (Kember et al., 2008; Wald et al., 2012). In the second level, thoughtful action,

individuals recognize emotions at a basic level, and make mention of the disorienting dilemma without more examination into the issue. Theory and practice suggest that reflective interventions are typically needed to help individuals reach the third and fourth levels of reflection that support transformative learning outcomes (Imperato & Strano-Paul, 2021; Mezirow, 1991; Moon, 1999; Perusso et al., 2020). Within the third reflective level, reflection, individuals start to explore their feelings and the disorienting dilemma further (Mezirow, 1991). In the fourth level, critical reflection, individuals challenge the disorienting dilemma, looking at the situation from multiple perspectives. Individuals not only acknowledge their feelings, but also try to gain more insight into how and why the feelings arise. This level is very difficult to assess within reflective writing and is the least likely to be seen in written responses (Kember et al., 2008).

Prior work has incorporated an assessment rubric to evaluate individuals' thoughts and feelings within their reflective writing. While multiple rubrics exist for this purpose, the REFLECT rubric (Wald et al., 2012) was created based on Mezirow's (1991) four reflective levels. This rubric has been validated (Daryazadeh et al., 2020) and used in research studies to evaluate the depth of students' reflective writing (Brown et al., 2020). For instance, one study utilized the rubric to assess the depth of medical students' reflections in private versus public (social media) essay formats (Brown et al., 2020). The study utilized multiple raters to score the essays on one of the four reflective levels. Per the REFLECT rubric, depth of reflection is scored based on the following five criteria: writing spectrum, presence, description of conflict or disorienting dilemma, attending to emotions, and analysis/meaning making (Wald et al., 2012). After reaching strong interrater reliability utilizing the rubric, Brown and colleagues (2020)

conducted a t-test to find no statistically significant difference in students' reflective depth in public versus private formats.

The REFLECT rubric was initially created to assess lengthy student essays within higher education. However, because the rubric was not created for free-choice learning contexts, the two coders found it difficult to evaluate such short responses on the postcards within the "presence" criteria of the original rubric. Therefore, they only applied four relevant criteria of the rubric to code each participants' reflective level (See Appendix G for more details). Each reflective level was given a score of 1–4 (1 = *habitual action*, 4 = *critical reflection*). In contrast to the sentiment and content analyses, each participant's response was coded as a whole and thus, could not be assigned to multiple reflective levels. Table 14 provides the frequency of each reflective level per condition, along with representative quotes from each reflection level.

As seen in Table 14, the majority of participants' responses across the reflective prompts were coded within the first two levels, habitual action ($n = 58$) and thoughtful action ($n = 40$). Following the example of previous research (Brown et al., 2020), an independent sample t-test was conducted to identify differences in overall reflection depth between pre-exhibit and post-exhibit responses in the pre and post condition. Results from pre-exhibit responses ($M = 1.43$, $SD = 0.65$) and post-exhibit responses ($M = 1.78$, $SD = 0.76$) revealed that significantly deeper reflections were made after the exhibit, $t(80) = -2.19$, $p = 0.031$. By looking at the descriptive statistics, we can see that participants made more habitual action comments in pre-exhibit ($n = 30$, 65.22%) than in post-exhibit responses ($n = 14$, 38.89%), and more thoughtful action comments in the post-exhibit ($n = 17$, 26.09%) compared to pre-exhibit responses ($n = 12$, 47.22%). There was no statistical difference between the overall depth of the

pre and post conditions' ($M = 1.78$, $SD = 0.76$) and post only conditions' ($M = 1.78$, $SD = 0.79$) post-exhibit responses, $t(66) = -0.02$, $p = 0.985$.

Results from the content analysis revealed more insight into the topics participants reflected upon (Table 15). Within habitual action, participants mostly responded with shark knowledge or shark features. Positive and negative affect were also common within this level due to simple, one-word responses such as "cool" or "scary." Mezirow's reflective model (1991) identifies that in the movement from non-reflection to thoughtful action individuals will make mention of a disorienting dilemma and recognize emotions at the basic level. In the present study, the most common disorienting dilemmas took the form of human-shark interactions. This is noted by an increase of responses falling within the perceptions, mixed affect, curiosity, and new knowledge themes from habitual action to thoughtful action responses. As participants reached third level reflections, they continued to discuss the disorienting dilemma, noted by another increase in responses within the perceptions theme. Only one instance of critical reflection within the post-exhibit condition of the pre and post condition was observed. This individual indicated a confirmation of their initial thoughts, but also acknowledged new information they learned at the exhibit about shark conservation and started to explore how this new information made them feel (See Table 14 for direct quote). Appendix F provides additional examples of representative quotes within each reflective level.

Table 14

Level of Reflection: Frequencies per Condition and Representative Quotes

Level of reflection	Pre-exhibit (Pre and post)	Post-exhibit (Pre and post)	Post-exhibit (Post only)	Representative quotes
Habitual action (Nonreflective)	30	14	14	*"Majestic; beautiful; cool to see"* *"Keep our ecosystems in balance"* *"Intimidating; scary"*
Thoughtful action	12	17	11	*"Apex predators; that they haven't evolved in millions of years is amazing"* *"I love the ocean and swimming, but don't want a shark to eat me"* *"Diverse; interesting creatures; more hunted than responsible for human deaths; nurse sharks are interesting"*
Reflection	4	4	7	*"I like sharks in general. There are lots of cool facts about sharks. I love being able to show my 2 year old them for the first time, but I am always a little sad to see animals in captivity."* *"Misunderstood and demonized; serve a purpose in the ecosystem; unique species that should be protected"* *"Gentle beasts of the sea; It makes me upset sharks continue to get slaughtered for their fins. Such a misunderstood species"*
Critical reflection	0	1	0	*"Original thoughts that they are just doing what they naturally do to survive was confirmed. However, I feel even more sympathetic after reading how many sharks are 'finned!'"*
Total	46	36	32	

Table 15

Frequency of Sub-Ordinate Themes per Reflective Level

Sub themes	Level of reflection			
	Habitual action (Nonreflective)	Thoughtful action	Reflection	Critical reflection
Positive affect	29	19	5	1
Negative affect	16	9	6	0
Mixed affect	0	9	1	0
Perceptions	2	11	12	0
Curiosity	0	6	1	0
Shark knowledge	29	7	6	0
Shark features	21	7	3	0
New knowledge	0	4	0	1

CHAPTER V: DISCUSSION AND CONCLUSION

Zoos and aquariums and other free-choice learning institutions can play an important role in biodiversity conservation, in part, by engaging visitors with on-site programming. Through various structured opportunities (e.g., signage, exhibit design, programming), Z/As attempt to and have been shown to influence a myriad of pro-environmental cognitive, affective, and behavioral outcomes among their visitors (Lindemann-Matthies & Kamer, 2006; Minarchek et al., 2021; Pepin-Neff & Wynter, 2018). Here, I explored the role of and opportunity for reflection, a previously under examined factor in the context of Z/A literature and practice in supporting visitor's cognitive and affective outcomes. Specifically, across two studies I sought to expand our understanding of whether and to what extent aquarium visitors naturally reflect, and whether the introduction of intentional reflective prompts can influence aquarium visitors' self-reported curiosity and affect. Findings from Study 1 revealed some meaningful differences among visitor demographics and self-reported reflection. Comparatively, Study 2 revealed no differences in visitors' self-reported curiosity and affect for sharks between the control and experimental conditions. However, qualitative findings provided important information relative to what visitors were reflecting on and at what depth their reflections were occurring.

Findings revealed that post-exhibit reflective interventions may have helped visitors move beyond basic fact reporting and into surface level reflections in which they were able to analyze their thoughts and feelings toward sharks. The following chapter discusses the findings of this mixed methods work, by situating it in conversation with the broader Z/A and reflection literature. I start by discussing critical findings of Studies 1 and 2 in relation to previous literature. Furthermore, I discuss a series of limitations associated with both studies and offer suggestions for future research wishing to expand on the role and potential of reflection within

free-choice learning institutions. Finally, I provide practical implications of the research along with its contributions to Z/A literature and reflective theory.

Natural Reflection Among Visitors

The aim of Study 1, as highlighted in my first research question, was to learn more about the state of visitors' natural reflection in an aquarium exhibit space by means of a self-report survey. Overall, participants reported reflection scale scores above the midpoint, indicating JA visitors are engaging in natural reflection at the shark exhibit. Descriptively, this finding is supported by a small, yet growing body of literature, indicating that wildlife tourism experiences, such as zoo and aquarium visits, may support and/or elicit opportunities for reflection and meaning making among visitors (Ballantyne et al., 2011; Luebke, 2018; Luebke & Matiasek, 2013; Riedinger & Storksdieck, 2023). These findings collectively converge on the intersection of free-choice learning environments and models of experiential learning and reflective practice, suggesting that such environments, and subsequent exhibit experiences nested within these contexts, may serve as "concrete experiences" for visitors to reflect on and revisit their thoughts and feelings (Boud, 2001; Kolb, 1984; Morris, 2020). That is, such experiences may support self-initiated reflection that have been reported in different marine-based wildlife tourism experiences (Ballantyne et al., 2011). Specifically identifying and teasing apart what experiences, programming, etc. may elicit more or less self-initiated reflection continues to be an area ripe for further inquiry. While some reports submit that the overall Z/A experience elicits reflective thought (Packer & Ballantyne, 2016; Pekarik et al., 1999), other observational and correlational work has narrowed in on the role of specific exhibits and spaces between exhibit experiences as opportunities for reflection (Luebke & Matiasek, 2013; Riedinger & Storksdieck,

2023). However, it remains unclear what specific experiences may more or less promote opportunities for self-initiated reflection.

Findings of Study 1 also revealed differences in reflection scores among visitor motivations. Descriptively, facilitators reported reflecting the least of all five visitor motivations, and post-hoc comparisons suggest that facilitators reflected significantly less than hobbyists. While this is a subtle and perhaps, likely finding, given the other-focused demands of facilitators (Falk et al., 2008), it is nonetheless an important one. Compared to hobbyists, who are described as engaging in self-directed activities that relate to their underlying personal interests (e.g., behind the scene tours, photo tours, dive trips, and themed events), facilitators identify other members of their group as their main priority (Bueddefeld, 2019) and are the only visitor motivation group that allows children to lead the groups' activities (Falk et al., 2008). Hobbyists, on the other hand, are the least likely of all five visitor motivations to let a child lead the way (Falk et al., 2008). The other-focused demands on facilitators can limit their experiences to those that their social group can take part in (Falk, 2009). However, it's important to note that visitor motivations are not static, meaning they can differ between visits for repeat visitors, or even change over time (Falk, 2011). Therefore, it's important for Z/As to provide varying opportunities for different visiting groups to reflect. For example, hobbyists may benefit from individual postcard reflections, while facilitators may benefit from more social reflections (e.g., structured group discussions) that provide opportunities to include their children and/or other group members. Taken together and in light of the reflection scale used in Study 1, which involved self-reflective questions focusing on the individual rather than the collective group, these findings suggest that facilitators may require more social reflections at the group level.

Across nascent Z/A research, facilitators have also been shown to measure lower on other notable outcomes. For instance, facilitators demonstrated less learning on site at Z/As than other visitor motivations (Schultz & Joordens, 2014). Aside from potentially being busy with children, some argue that facilitators' visits are purely extrinsic in nature, meaning that they view Z/As as a means for their child's education more than their own (Schultz & Joordens, 2014). Developing opportunities that support their positive affect and understanding of a species may play a critical role not only for them, but also for fostering these outcomes in others, specifically children. Indeed, research shows that relevant adults (e.g., facilitators, parents) act as critical role models in directing children's learning of PEBs (Grønhøj & Thøgersen, 2017) and modeling important behaviors such as respect and empathy toward animals (Knudson, 2019; Young et al., 2018). In light of this important role, researchers highlight the need to specifically plan on-site learning experiences for facilitators if Z/As want them to exhibit learning outcomes on-site (Bueddefeld, 2019). Taken together and in light of the important function facilitators play in shaping positive nature connections in others, providing on-site opportunities that directly support and enhance the facilitator experience are needed to meet affective and learning outcomes that may not only benefit them, but also their children as well (Bueddefeld, 2019).

Study 1 also finds that exhibit dwell time may influence natural reflection among visitors. Findings reveal that visitors who reported spending over 10 minutes at the shark exhibit had higher levels of self-reported reflection than those who spent between 2–5 minutes at the exhibit. Extended dwell time has yielded similar reflective outcomes in prior work (Pavitt & Moss, 2019). For instance, participants who spent more time in an exhibit space made more comments related to conservation and their own emotions compared to participants who spent less time, and made more surface level comments, such as where an animal was located in the

exhibit or describing animal anatomy (Pavitt & Moss, 2019). Findings regarding the impact of dwell time are important since prior research supports that time spent in nature and with animals is positively associated with connection to nature (Blizard & Schuster, 2007; Chawla, 2007, 2009; Cheng & Monroe, 2012) and empathy for animals (Myers et al., 2009). To that end, reflection may serve as an important mechanism in facilitating these outcomes (Myers et al., 2009).

Since most of this work is correlational, we are left to theorize what factors contribute to the interplay of exhibit dwell time and natural, self-initiated reflection. Luebke and Matiasek (2013), who also found visitors naturally reflected within an exhibit space, suggest that exhibits replicate a restorative environment (Kaplan, 1995; Kaplan & Kaplan, 1989). Kaplan's (1995) attention restoration theory suggests that mental fatigue, concentration, and psychological well-being can be improved by time spent in or viewing nature. Kaplan (1995) submits that exposure to nature can reduce the daily fatigue brought on by directed, effortful attention, allowing individuals to think more deeply about their surroundings, thoughts, and feelings. This is, in part, thought to be driven by elements or properties of nature that are innately fascinating, such as animals, that don't require directed attention, leaving an individual with the mental facilities to reflect more deeply about not only the experience, but also their thoughts and feelings about what they are seeing (Kaplan, 1995). To that end, animal's physical appearance, animal visibility, animal activity level, and exhibit characteristics have all been associated with increased exhibit dwell time (Margulis et al., 2003; Moss & Esson, 2010; Ridgway et al., 2005; Watters et al., 2011). Furthermore, aquatic exhibits tend to elicit dwell times twice as long as non-aquatic exhibits (Ridgway et al., 2005) and sharks themselves have been shown to elicit a "wow factor" among humans, eliciting mixed emotions such as fear, admiration, and fascination

(Neves et al., 2022; Sevillano & Fiske, 2016). Taken together, characteristics of the exhibited species along with certain exhibit features may support self-initiated reflection. Future research may want to focus on the intersection of exhibit interpretation, dwell time, and restorative environments on visitors' reflections within exhibit spaces.

Annual Z/A visitation did not significantly impact visitors' natural reflection at the shark exhibit. This result adds to the mixed findings regarding the influence of repeated Z/A visitation on different outcomes. Although some studies find that repeat Z/A visitation is "one of the most significant" predictors of increased conservation knowledge and appreciation of wildlife (Godinez & Fernandez, 2019; Learmonth et al., 2021; Moss et al., 2017; Yalowitz, 2004), one notable study suggests that repeated Z/A visitation is not significantly related to factors such as concern, behavioral intent, behavior, self-efficacy, conservation knowledge, negative and positive affect, and perceived learning (e.g., Clayton et al., 2017). With that said, the relationship between visitation frequency and reflection remains unclear, providing an avenue for future research to explore.

A Reflective Intervention at the Aquarium

Quantitative findings from Study 2 suggest that the reflective interventions did not have an effect on either curiosity or affect. Descriptively, self-reported curiosity and affect were relatively consistent across the conditions. Participants in all three conditions expressed curiosity, excitement, respect/admiration, concern, wonder/awe, sense of connection, love, and compassion above the scale midpoints. Moreover, fear was well below the midpoint in all three conditions. These similar levels of curiosity and affect may be due to the robustness of the reflective prompt in the experimental conditions. The prompt in the present study asked participants to report their overall thoughts and feelings about sharks. However, research

suggests more guided and focused prompts may be necessary to reach intended affective and cognitive outcomes (Imperato & Strano-Paul, 2021; Renner et al., 2020; Shapiro et al., 2006). Greater refinement of the reflective prompt may support broader engagement with sharks and their conservation. These and other limitations, as well as future research considerations, are discussed in greater detail below.

Study 2 utilized a mixed methods approach yielding qualitative data in the form of participants' written responses to the reflective prompts (i.e., postcards). In a review of Z/A literature, Mellish et al. (2018) highlight the need for such mixed method research, as qualitative data can help reveal complexities that may not be readily observed in quantitative approaches and analyses. This was the case with the present study, as qualitative analyses provided more insight into how (e.g., sentiment, topical content) and at what depth visitors were reflecting, including specific thoughts and feelings toward sharks that were not identified in the survey. Overall, qualitative reflective analyses revealed that visitors expressed a range of expressions, including both positive and negative affect, as well as fact-based statements. Furthermore, it appears that the reflective interventions were helpful in getting visitors in the experimental conditions to think, at least in slightly more nuanced ways about sharks after their exhibit experience (e.g. "most are smaller than I thought they would be").

Combined content and sentiment analyses revealed that visitors expressed strong positive affect toward sharks upon entering the aquarium and in post-exhibit reflections. These findings align with past Z/A research and an overall global shift in general positive attitudes toward sharks (Acuña-Marrero et al., 2018; Friedrich et al., 2014; Giovos et al., 2021). In the current study, positive affect was expressed most often with the word "cool" and through statements such as "like/love them." In post-exhibit reflections, positive affect was more focused on their

recent exhibit experience. For example, one visitor wrote "seeing them up close is so powerful," while other visitors liked seeing the variety of shark species, and the exhibit in general. Two visitors highlighted positive affect related to sharing the experience of seeing sharks with children or grandchildren. Given that facilitators identify other members of their group as a main priority (Bueddefeld, 2019), it's possible these reflections came from visitors within this motivation.

Shark knowledge and shark features were also popular themes to arise from the content analysis in both pre-exhibit and post-exhibit reflections. Reflections within these themes made mention of sharks as apex predators. For example, "king of the ocean," "important to ecosystem," and "great senses" were frequently mentioned shark facts, and "big size" and "teeth" were commonly reported shark features. This is consistent with past research that finds aquarium visitors commonly mention shark teeth when asked to say a few words about sharks (Neves et al., 2021a). Collectively, these responses feed into the "threatening awe-predator stereotype" which suggests that predator species elicit fear, but also hold our attention and admiration due to their competence, intelligence, and perceived beauty (Sevillano & Fiske, 2016). This is further evident in visitors' reflections about shark teeth, as many visitors reported liking shark teeth, and made comments such as, "cool because of their teeth," while others referred to shark teeth as scary. This notion is further supported by the emergent mixed affect theme in both the sentiment and content analyses. Reflections within this theme simultaneously highlighted content that can be categorized as both approach and avoidance assessments, with responses such as "graceful, but still afraid," and "dangerous, but beautiful."

The present study, along with previous research, suggest that aquariums can still educate already knowledgeable visitors about sharks. For example, a previous study finds that only half

of aquarium visitors who claimed to know about shark "finning" were able to accurately describe it (Friedrich et al., 2014). Indeed, while visitors entered JA with strong knowledge about sharks, a content analysis reveals that some visitors expressed increased knowledge, particularly about finning practices and learning about different, smaller shark species that are not typically portrayed in the media (i.e., "most are smaller than I thought they would be"). While some visitors made statements such as "I learned a lot more about sharks," two visitors made direct mention of information provided on conservation signage with the Atlantic shark exhibit (see Appendix A for pictures of signage). Most notably, one participant stated, "I didn't know there were so many sharks that 100 million could ever be available to be killed for fins" while another claimed, "I feel more sympathetic after reading how many sharks are finned!" Increasing accurate, more complex knowledge about sharks such as the information provided on JA's signage can be important for conservation outcomes, as a global survey finds that people who do not exhibit strong shark knowledge tend to agree with more fear-related statements such as "sharks are dangerous to humans" and "we should manage sharks populations to sustain other fish stocks" (Giovos et al., 2021). While this, in part, contrasts literature downplaying the assumptions of the information-deficit model, such work highlights that knowledge is not unimportant. Since the present study finds support that few JA visitors engage with signage at the shark exhibit, future research may want to create more focused post-exhibit reflective prompts that align with conservation signage.

Combined sentiment and content analyses assessing reflections for the pre and post condition revealed that visitors made significantly more negative affective sentiments about sharks before the exhibit than after. Similarly, previous research finds that experience with sharks correlates with positive attitudes toward them (Acuña-Marrero et al., 2018; Friedrich et

al., 2014) and leads to reduced fear and reduced negative views of them (Miller et al., 2005; Pepin-Neff & Wynter, 2018). While visitors still made negative affective comments after the exhibit (e.g., "Still terrified by the thought of getting bit by one. Jaws scarred me for life!"), there were less fear related reflections overall. For example, negative sentiments included feeling sad about sharks' negative stereotypes (e.g., "sad they are so misunderstood") and dire conservation state (e.g., "upset they continue to get slaughtered for their fins"). Similar sentiments were not present in pre-exhibit reflections. Taken together, direct experiences along with opportunities to reflect on them, may be a helpful tool to help not only reduce negative public affect toward sharks, but gain empathy for their declining populations.

While quantitative analyses did not reveal statistically significant differences between the control and experimental conditions, examining the qualitative and quantitative results alongside one another provided an interesting perspective. Indeed, the main purpose of using mixed methods research in this study was to expand on the breadth of participants' affective responses and cognitions through the written reflection (Greene et al., 1989; Schoonenboom & Johnson, 2017). This mixed methods approach also provided triangulation for measuring the dependent variables (Tonkin-Crine et al., 2015). For example, curiosity arose as an emergent theme in the content analysis. Visitors expressed interest in sharks through short reflections such as "fascinating" and more detailed statements such as "my granddaughter could watch them all day." The eight target emotions from the survey can also be seen within participants' reflective responses. For example, survey responses indicated lower overall levels of expressed fear and statements directly or indirectly related to fear also appeared less frequently in both the sentiment and content analyses. Furthermore, visitors' survey responses expressed excitement, wonder/awe, respect/admiration, love, and compassion above the scale midpoint. Similarly, content analyses

revealed numerous reflections expressing these affective responses (e.g., numerous uses of "love," "it's their world and we need to respect it," "excited to see them"). Taken together, the qualitative analyses helped to provide more insight into the curiosity and affective reactions measured on the survey.

Depth of Reflection

One of the more interesting findings of this work is related to the depth of participants' reflective responses. Although visitors' pre and post-exhibit responses in the pre and post condition could not be matched and compared due to the lack of tracking, aggregated results revealed that participants made significantly deeper reflections after the exhibit compared to pre-exhibit reflections (i.e., in the pre and post condition). Comparatively, there was no difference in reflection depth between both participants' post-exhibit responses in the pre and post condition and participants' post-exhibit responses in the post only condition. Thus, in this preliminary examination, there doesn't appear to be an appreciable difference between single vs. multiple points of reflection. This section provides more detail about the depth of these reflections in relation to Mezirow's (1991) four reflective levels.

Descriptively, participants made the most habitual action (nonreflective) comments upon entering the aquarium. When examining the content of participants' habitual action comments, most entailed basic fact reporting, descriptions of shark features, or general one-word affective statements such as, "cool" or "scary." As noted previously, prior work finds that when entering aquarium visitors are asked to say a few words about sharks, they typically mention physical features, facts, viewing sharks as a threat, and reference to movies such as Jaws (Neves et al., 2021a). Taken together, these types of responses suggest that most entering aquarium visitors

provide general stereotypical statements or one-word responses about sharks without, perhaps, thinking more deeply about their own thoughts or feelings.

Inferential statistics revealed a statistical difference in depth of reflection for participants in the pre and post condition when comparing their pre-exhibit and post-exhibit reflections. Descriptively, participants provided less habitual action responses and more thoughtful action responses after the exhibit. Based on Mezirow's reflection theory (1991) individuals start to mention a "disorienting dilemma," or conflict without much exploration into its meaning. In the present study, the "disorienting dilemma" seemed to coalesce around human-shark interactions, most notably mentioning sharks as misunderstood by people or the number of sharks killed by humans due to finning. This shift in habitual action to thoughtful action reflections is intriguing because, while not matched directly, the same individuals who stopped at the aquarium entrance stopped again after the exhibit. The prompt was exactly the same as the one they received upon entering the aquarium ("write a few words or phrases that explain your thoughts and/or feelings toward sharks"), with the addition of "after seeing them on exhibit." Therefore, it's possible the exhibit experience may have provided participants with a disorienting dilemma, resulting in more reflections within the thoughtful action level after the exhibit. Indeed, experiential reflective models (Boud et al., 1985; Kolb, 1984) suggest new experiences are needed to trigger the reflection process.

These results provide support for the integration of reflective models within both the iterative and vertical dimensions (Boud et al., 1985; Kolb, 1984; Mann et al., 2009; Moon, 1999). Reflective models within the iterative dimension involve an experiential component, in which a new experience triggers reflection that individuals can return to and revisit (Boud et al., 1985; Kolb, 1984; Schön, 1983). Comparisons between pre- and post-exhibit responses to the

same reflective prompt revealed that the shark exhibit triggered deeper thoughts compared to the basic fact reporting provided in pre-exhibit responses. Indeed, research supports the benefit of experiential learning, finding that first-hand exposure to sharks influences positive attitudes and increased knowledge about them (Acuña-Marrero et al., 2018; Miller et al., 2005; Pepin-Neff & Wynter, 2018). To that end, participants in the pre and post condition may have revisited not only their exhibit experience, but also their prior experience with the pre-exhibit reflection.

Additionally, the present study finds support for the vertical dimension of reflective models, characterized by different levels of reflection on an experience ranging from surface level to critical reflection (Mezirow, 1991; Moon, 1999). While responses in the present study mainly revealed shifts from nonreflective to surface level reflections, some participants reported third level reflections, with one participant reaching a critical reflection level. Within reflective models, these two levels of reflection are needed for the individual to experiment with behavior change related to the disorienting dilemma (Boud et al., 1985; Kolb, 1984; Mezirow, 1991; Moon, 1999; Schön, 1983). Therefore, future research within this context might want to test reflective prompts aimed specifically at the disorienting dilemma and attaching personal meaning to it. Such prompts may result in an increase in levels of reflection among aquarium visitors, potentially aiding in behavioral support for shark conservation.

The present dissertation explored the question if two reflection points resulted in any differences compared to only one reflection. All quantitative and qualitative analyses revealed no significant differences between post-exhibit reflections for visitors who also reflected at the entrance and those who only reflected once post-exhibit. The only statistical difference was revealed in the sentiment analysis. Individuals who reflected twice provided more mixed comments about sharks after the exhibit than those who only reflected once. Boud's experiential

model (2001) suggests that reflecting prior to an event can help an individual become aware of their thoughts and emotions. Since most pre-exhibit reflections involved non-reflective stereotypical shark responses, it's possible that these individuals were left to address these differences in thoughts and feelings in the second post-exhibit reflection. Those in the single post-exhibit reflection may not have addressed previous biases, as the study design did not bring conscious awareness to them before entering the aquarium. Despite this difference, mixed sentiments did not contribute to reflection or critical reflection, as participants' responses in both post-exhibit reflections mainly provided thoughtful action reflections. Based on prior research suggesting that the presence of additional questions or prompts may not produce additive effects compared to asking one question (Gutwill & Dancstep, 2017), these preliminary but suggestive findings indicate that future research should continue examining whether and to what extent multiple points of reflection enhance, maintain, or dampen visitor outcomes.

Additional Visitor Demographic Findings

From a practical perspective, understanding visitor demographics can help Z/As to create effective interventions and elicit intended outcomes. Data revealed some similarities and differences between JA visitors and general Z/A visitor demographics. For example, most Z/A visiting groups contain adults with at least one child (Khalil et al., 2023). JA visiting groups fit this predominant configuration with slightly over half of the participants falling into this category. However, adult only groups at JA were more represented than in the Z/A literature. Adult only groups typically represent one-third of Z/A visitors, with aquariums drawing slightly less adult only groups (Khalil et al., 2023). At JA, adult only groups accounted for 46.2% of the visiting groups in this study. Taken together, Z/As should continue to create opportunities to serve adult only groups.

In Studies 1 and 2, facilitators were the predominant visitor motivation, which aligns with much of the Z/A literature (Bueddefeld, 2019; Falk et al., 2008; Schultz & Joordens, 2014). Decades of research suggests that the majority of Z/A visitors credit spending time with family and friends as their main reason for visiting (Falk et al., 2007; Holzer et al., 1998; Khalil et al., 2023; Roe & McConney, 2015). This aligns with the facilitator visitor motivation, which involves visiting to support "what's best" for a family member or friend (Falk, 2009, p. 221). Hobbyists were the second most plentiful visitor motivation, a finding more common in aquariums than zoos (Bueddefeld, 2019; Falk et al., 2008; Schultz & Joordens, 2014). Hobbyists are drawn to aquariums because they typically own a home aquarium, or engage in recreational fishing (Falk et al., 2008). JA is located on the beach, and exhibits local fish species, a possible draw for local hobbyists.

Among remaining JA visitors, explorers were slightly underrepresented, and rechargers were slightly overrepresented when compared to past Z/A literature (Bueddefeld, 2019; Falk et al., 2008; Falk et al., 2007). However, research shows that recruitment methods and participant involvement may explain a lack of rechargers in other studies. For example, rechargers are underrepresented in studies involving interviews (Falk et al., 2007; Falk et al., 2008) and personal meaning mapping (Bueddefeld, 2019), and more represented in studies utilizing anonymous surveys (Schultz & Joordens, 2014) similar to the present study. Furthermore, experience seekers were the least represented visitor motivation at JA. Since experience seekers are drawn to new experiences, their representation across the Z/A literature is quite mixed depending on current happenings at the institution (Bueddefeld, 2019; Falk et al., 2007; Schultz & Joordens, 2014). Due to construction at JA, it's possible that experience seekers were less

drawn to the aquarium during the time of data collection. This will be explained further in the following limitations section.

Limitations and Future Directions

The current research presents a number of limitations that should be considered in review of the findings and in the design of future research. Many of these limitations stem from practical constraints on the research design due to the ephemeral nature of visitor interactions at free-choice learning environments, such as Z/As. This is not an unfamiliar challenge in Z/A research in which limited time with participants can impact methodological decisions. For example, one study wishing to recruit over 60 participants for face-to-face interviews limited their study sites to zoos with annual visitation over 500,000 in an effort to meet their quota (Roe & McConney, 2015). Another study utilizing a similar postcard design, found that many aquarium visitors did not stop to complete the cards because they were "in a hurry" or had children to attend to (Mann-Lange et al., 2023). To reduce participants' time commitment, the researchers did not include additional survey data in their study. In both instances, the researchers note that these design limitations may have resulted in biased samples (Mann-Lange et al., 2023; Roe & McConney, 2015). While a lottery incentive was used in both of the present studies to support participant recruitment and retention, similar subsequent decisions were made that encouraged minimizing participants' overall direct study participation (e.g., reduced survey questions, type of intervention prompt, etc.). It is more than likely that this slimmer, more economic design limited the depth, breadth, and generalizability of the present research.

The present study also raises a number of critical questions about the quality and robustness of the reflective prompts. The pre-exhibit and post-exhibit reflective prompts were simple and straightforward, asking participants their general thoughts and feelings about sharks.

While qualitative analyses revealed participants reflected more deeply during their post-exhibit reflections, these reflections appeared to only reach surface level thought. Due to lower levels of observed reflection, it's likely that the prompt wasn't robust enough and/or lacked content- and/or context-specific cues that might encourage deeper levels of reflection. Mezirow's transformative learning theory (1991) proposes that these deeper levels of reflection occur when individuals attach personal meaning to a conflict or disorienting dilemma. Indeed, past research shows that more specific and guided prompts regarding the conflict may be more helpful in reaching deeper levels of reflection and attaining intended cognitive, affective, and behavioral outcomes (Chen & Forbes, 2014; Imperato & Strano-Paul, 2021; Renner et al., 2020). While the present study was exploratory, it provided initial insight into the conflicts visitors were thinking more deeply about (e.g., misperceptions of sharks and finning practices), which aligned with sign interpretation at the exhibit. Research wishing to build on this work may want to create more focused prompts that align with conflicts presented in exhibit signage (and design signage that encourages such thoughts and feelings). These specific prompts may help visitors attach personal meaning to the conflict, resulting in deeper levels of reflection necessary to meet not only affective and cognitive outcomes, but also potential PEB change.

Furthermore, and due to time constraints, manipulation checks were not included within the current study outside of the actual reflective responses provided by participants. Future research may want to add manipulation checks (e.g., a reflective scale) to further assess and determine the salience of the prompts. Additionally, the intervention in the current study took the form of a written reflective prompt. However, past research has found that reflective interventions in the form of guided group discussions to be an effective strategy to enhancing both affective and cognitive outcomes (Imperato & Strano-Paul, 2021; Perusso et al., 2020;

Sobral, 2000) and since aquariums are social experiences (Khalil et al., 2023; Riedinger & Storksdieck, 2023), future research may want to test the effectiveness of reflective prompts in the form of guided group reflections. Examining the potential of discussion-based reflection may be particularly important since past research finds visiting groups with children are more unlikely to stop for written activities such as the postcard reflections (Mann-Lang et al., 2023). Furthermore, zoo visitors have identified interpretation provided by staff and volunteers to be the most impactful source of knowledge during their experience (Ouellette, 2017). In recognition of time constraints, ascertaining how best to incorporate group-based reflection may be difficult, though not impossible (e.g., Rowe et al., 2023). Therefore, future studies may think about incorporating reflective questions into Z/A programming, or even training staff and volunteers to ask these questions to visitors during conversations outside of bigger group programs. This may be particularly useful for facilitators, as they can engage in the reflections themselves, but also prompt their children (or others in their group) to think more deeply about the questions raised. Understanding how reflection is best delivered, in what form and by whom, may be critical in achieving intended outcomes.

These studies also relied on self-report measures, and thus were subject to related biases. For example, surveys lend themselves to skipped items or increased guessing rates when participants do not understand the question (Soland et al., 2019). In Study 1, the researcher found that many participants skipped questions on the demographic page. Therefore, for Study 2 the researcher employed a "no skip" logic on Qualtrics. However, this may have led to increased guessing rates among participants (Rios et al., 2017). Indeed, some participants in Study 2 asked the researcher if the affective item "concern" meant concern for sharks, or concern about sharks as a threat to them. While some participants asked for this clarification, it's unclear how many

participants did not ask and instead interpreted the item on their own. Another important limitation concerned the ability to track participants' pre- and post-exhibit reflections to test for changes within the individual's sentiments and reflections (in addition to tracking or linking their quantitative and qualitative responses). Although some important findings emerged from participants detached and aggregated data, future research utilizing a mixed method design may want to consider tracking participants' quantitative and qualitative data in order to triangulate results.

In relation to the aforementioned design constraints, sample selection and sample size also presented some limitations. For example, due to time constraints the researcher only asked a few demographic questions related to the primary research questions (e.g., visitor motivation). Future work may want to be more intentional about sampling to ensure a representative sample across variables such as socioeconomic status, race, and gender. The exclusion of such information is a major limitation of the current study within current Z/A research, as AZA's most recent social science agenda places a focus on striving for environmental and social justice (Kubarek et al., 2023).

Furthermore, another limitation and potential bias to the sample may be due to construction at the aquarium during the months of data collection. In addition to putting a hold on annual summer programming, the construction resulted in many exhibits of an already smaller sized aquarium being off limits to visitors. It's possible that the effects of this circumstantial construction resulted in a small number of experience seekers observed in Studies 1 and 2, among other impacts. Finally, Study 2 had a relatively small sample size and limited variability of visitor motivation across conditions, which precluded (e.g., limited power) examining any potential interactive effects. Taken together, future research should gather more demographic

data and be more intentional about gathering larger, unbiased samples. This may include, for example, sampling throughout the year as opposed to only summer months.

Future studies should also explore the role and potential for visitor reflection within zoo settings and with other species. This is particularly relevant given participants' overall high levels of self-reported curiosity and affect associated with the species seen here and in other studies (Acuña-Marrero et al., 2018; Friedrich et al., 2014; Giovos et al., 2021). Species who garner less overall support, understanding, and positive affect may benefit from intentional experiences, perhaps in the form of reflective interventions, that support and encourage intended visitor outcomes. To that end and in light of past research finding that visitors spend two times longer at aquatic exhibits than they do at non-aquatic exhibits (Ridgway et al., 2005), it's also important to consider how opportunities for intentional reflection may support engagement with non-aquatic exhibits and species. As part of this discussion, it may also be important to discern whether and how reflection differentially manifests within aquarium versus zoo settings. While the present dissertation often lumped these free-choice learning environments together, past research has found differences between zoo and aquarium visitors' motivations and expectations. For example, aquariums are more likely to draw tourists, while zoos attract more local visitors (Ballantyne & Packer, 2016). This is linked to differences in expectations as well, as aquarium visitors think it's more important for the institution to provide information about environmental issues and encouragement to reflect on those issues than zoo visitors (Ballantyne & Packer, 2016). Taken together, future studies should expand assessments of natural self-initiated reflection and reflective interventions to zoo settings and to different species who may be differentially perceived (cognitively, affectively) and engaged with by visitors.

In conclusion, this research has provided a useful update to nascent work examining the state of reflection among Z/A visitors and a preliminary investigation into the potential of prompted reflections to support visitor outcomes. Given the importance of reflection to transformative learning outcomes, future research may want to improve upon the limitations and future research suggestions provided in this section to continue exploring reflection and its potential benefits in Z/A settings.

Contributions and Practical Implications

There are several contributions associated with this work. One of the challenges with models of reflective practice is translating their components into practice. Here, I sought to integrate both iterative and vertical aspects of reflective models, by assessing multiple points of reflection (pre and post vs. post only) as well as assess participants' level of depth concerning their reflection. To that end and to the best of my understanding, this is one of the first studies to apply the REFLECT rubric (Wald et al., 2012) in the context of Z/As, specifically. This evaluative tool can be leveraged in future Z/A work, seeking to better understand to what extent visitors are reflecting on their experiences within these settings.

The present work also adds to the growing call in Z/A research for more experimental and qualitative work (Mellish et al., 2018). Here, I incorporated a between subjects randomized control study in the context of Z/As to assess the efficacy of an under examined mechanism (i.e., reflection) that has been shown in other domains to support cognitive and affective shifts. Furthermore, the mixed method study also included qualitative data, filling another notable gap in Z/A literature and allowing for a deeper analysis of visitors' reflective experience, including the content and depth of their reflection pertaining to sharks and the shark exhibit, specifically.

This research also presents practical implications for Z/As, including ways that reflection could be integrated into different programming efforts. The postcard reflection utilized in this research is relatively cost-free and does not require additional facilitation to enact. Depending on the institution's mission and goals, they can tailor the reflective prompt to facilitate thoughts and affective responses about specific species and/or conservation messages. This type of interpretation may be especially beneficial for smaller institutions, who may not have the money to design a completely new exhibit such as Monterey Bay Aquarium's new $15 million Into the Deep exhibit which was intentionally designed to elicit empathy for deep sea invertebrates (Monterey Bay Aquarium, 2022).

Z/As with a lack of personnel (i.e., staff or volunteers to run programs or engage with visitors) can provide the resources for visitors to engage in a reflective activity on their own, or with their social group after an exhibit experience. While past research using a similar postcard method found that facilitators without children were unlikely to stop and complete the activity, adult only groups did stop to take part (Mann-Lang et al., 2023). This may provide a fruitful outlet for smaller Z/As to engage a large demographic of their visitors, adult only groups. To engage all visiting social groups, Z/As may want to embed reflection into more social aspects of the visitor experience. For institutions who do have the personnel and resources, staff and volunteers could be trained to incorporate specific reflective questions into their personal interactions with visitors, and even into larger programmatic settings such as keeper talks during animal feedings. This may be another favorable avenue, as past research shows that zoo visitors report that interpretation facilitated by people (e.g., docents, volunteers, employees) to be the most impactful source of knowledge during their experience (Ouellette, 2017).

Conclusion

Over the past 20 years, Z/As have been in search of effective strategies to strengthen visitors' understanding, care, and concern for wildlife and gain behavioral support for conservation efforts. While many behavior change models have been implemented and tested in Z/A settings, limited work has considered models of reflection and the role and potential for reflection in such contexts. Drawing on empirical work nested within higher education and business settings that provides support for the influence of reflection on achieving targeted outcomes, the present dissertation aimed to learn more about how aquarium visitors naturally reflect and examine the effectiveness of a reflective intervention on visitors' curiosity and affect.

The amount of time visitors spent at the shark exhibit as well as their primary visitor motivation were associated with visitors' natural self-initiated reflection. While reflective interventions yielded no quantitative differences on curiosity and affective outcomes between the control and experimental conditions (e.g., single vs. multiple points of reflection), qualitative data provided through visitor written reflections revealed that visitors enter the aquarium with strong knowledge and positive feelings about sharks and continue to express these throughout their visit. Further qualitative analyses revealed that individuals who did enter the aquarium with negative emotions about sharks expressed significantly less negative sentiments in their post-exhibit reflections. Reflection analyses further revealed that the exhibit and intervention were effective in eliciting slightly more in-depth reflection. Visitors reflected more about negative shark stereotypes and dire shark conservation status in these second-level reflections.

Since this is one of the first studies to explicitly apply reflection theory and reflective practice to a Z/A setting, future research can take many directions. The strongest suggestion related to achieving behavioral outcomes for shark conservation requires a more focused

reflective intervention prompt, perhaps by focusing on relevant participant reflections (e.g., disorienting dilemmas), including negative shark stereotypes and dire shark conservation statuses. Future studies may want to create a more focused prompt that requires visitors to make these dilemmas more personally meaningful. Such prompts may elicit more third and fourth level reflections among visitors, meeting the depth of reflection many reflective models identify as necessary for significant change.

Indeed, in light of the world's mounting biodiversity and climate crises, identifying relevant and meaningful pathways to support individuals' greater engagement with and connection to wildlife is critical. Here, I offered an exploration into the role and potential for reflective thought in the context of free-choice learning environments, specifically Z/As, to examine whether and how such practices may support visitor outcomes. While the findings were limited in their impact and scope on one particular species, enhancing our understanding of how reflection, and other intentionally designed opportunities, supports conservation, more broadly, is of the utmost importance for the environment and all beings.

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Appendix A: Pictures of Jenkinsons Aquarium's Shark Exhibit

Figure A.1

Front View of Atlantic Shark Exhibit

Figure A.2

Side View of Atlantic Shark Exhibit

Figure A.3

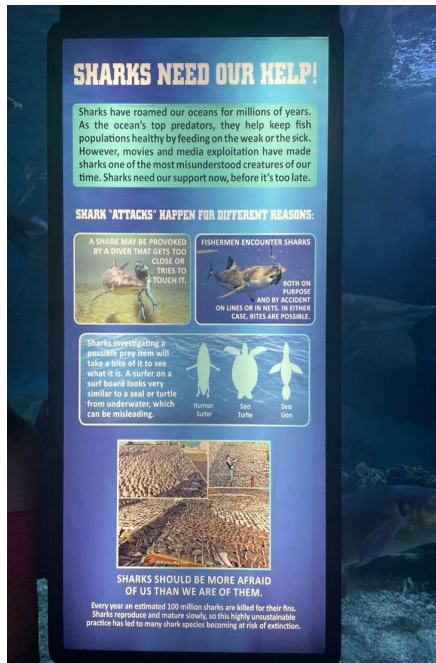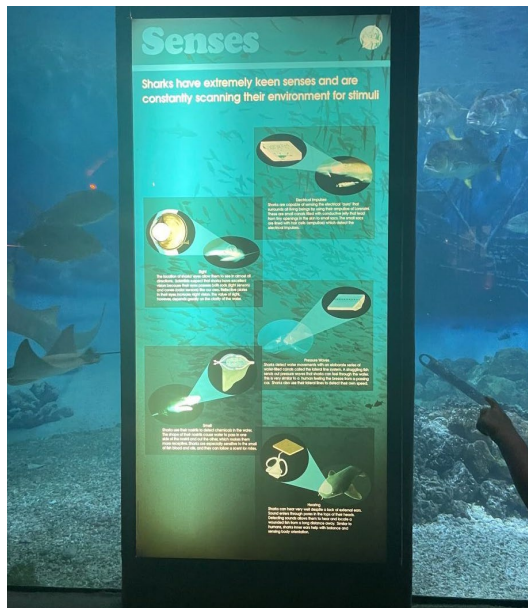*Conservation Signage at Atlantic Shark Exhibit*

Figure A.4

Informational Signage of Shark Senses at Atlantic Shark Exhibit

Appendix B: Verbal Informed Consent Script

"Hello, my name is Nicole and I am a PhD candidate at Antioch University. I am interested in learning more about your experience at the shark exhibit today. Would you be interested in providing 5-10 minutes of your time to answer some questions? By participating, you have the opportunity to be entered into a lottery to win a $25 or $50 Amazon gift card."

Participant: Yes/No

"Your participation is voluntary. You can decline to answer any of the questions in this survey, as well as to stop participating at any time. If you have any additional questions concerning this research or your participation in it, please feel free to contact me at any time."

Appendix C: Study 1 Survey

1. Which statement best describes your visit today?
    - I'm here because the Aquarium is an important destination to visit at the Jersey Shore
    - I'm here to see and learn about wildlife
    - I'm here to spend time with my friends and/or family
    - I'm here because the Aquarium connects with other personal interests of my own
    - I'm here to relax and recharge

Please answer the following questions about your experience at our Atlantic shark exhibit.

1. I was reminded of a previous place, experience, or animal.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

2. I spent time examining my feelings.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

3. I took time to reflect on my thoughts

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

4. I thought about the way I feel about animals.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

5. I found myself reflecting on new ideas about animals and their environments.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

6.   It is important to me to understand the feelings this exhibit raised for me.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

7.   It is important to me to understand the thoughts this exhibit raised for me.

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

Almost done, just a few more questions about you.

3. How often do you visit zoos/aquariums/nature centers each year?
    A. 0-1 time per year
    B. 2-3 times per year
    C. 4-5 times per year
    D. Over 5 times per year

4. How many people came with you to the aquarium today?
    A. Number of adults:
    B. Number of children under 18:

5. How much time did you spend at the Atlantic shark exhibit?
    A. Less than 2 minutes
    B. 2-5 minutes
    C. 5-10 minutes
    D. Over 10 minutes

Thank you for your time spent taking this survey. Your input is greatly appreciated!

Appendix D: Study 2 Survey

Please answer the following questions about your experience at our Atlantic shark exhibit.

1. I am interested in seeking out more information about sharks

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

2. I wanted to learn more about the connections between sharks and people

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

3. I wanted to learn more about what else I can do to help sharks

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

Please rate the intensity (1= *not at all*, 7=*very much so*) to which you felt the following emotions at the Atlantic shark exhibit:

1. Fear

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

2. Excitement

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

3. Respect/admiration

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

4. Concern

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

5. Wonder/awe

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

6. Sense of connection

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

7. Love

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

8. Compassion

1	2	3	4	5	6	7
Not at all			Somewhat			Very much so

Almost done, just a few more questions about you.

1. Which statement best describes your visit today?
   - I'm here because the Aquarium is an important destination to visit at the Jersey Shore
   - I'm here to see and learn about wildlife
   - I'm here to spend time with my friends and/or family
   - I'm here because the Aquarium connects with other personal interests of my own
   - I'm here to relax and recharge

2. How often do you visit zoos/aquariums/nature centers each year?

   A. 0-1 time per year
   B. 2-3 times per year
   C. 4-5 times per year
   D. Over 5 times per year

3. Please estimate the number of minutes you spent at the shark exhibit today.

Thank you for your time spent taking this survey. Your input is greatly appreciated!

Appendix E: Sample Postcards for Reflective Intervention

Figure E.1

Example of a Completed Pre-exhibit Post Card

Please write a few words or phrases that explain your thoughts and/or feelings toward sharks.

Sharks are amazing animals. they are scary and afraid of them biting. But they are pretty. Are fun to watch.
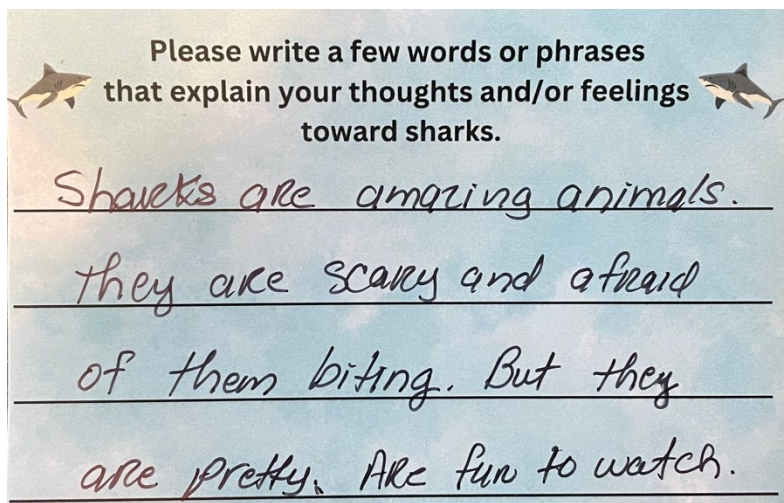
Figure E.2

Example of a Completed Post-exhibit Post Card

Please write a few words or phrases that explain your thoughts and/or feelings toward sharks after seeing them on exhibit today.

I learned a lot more about sharks and that my granddaughter could watch them all day! Loved them ♡
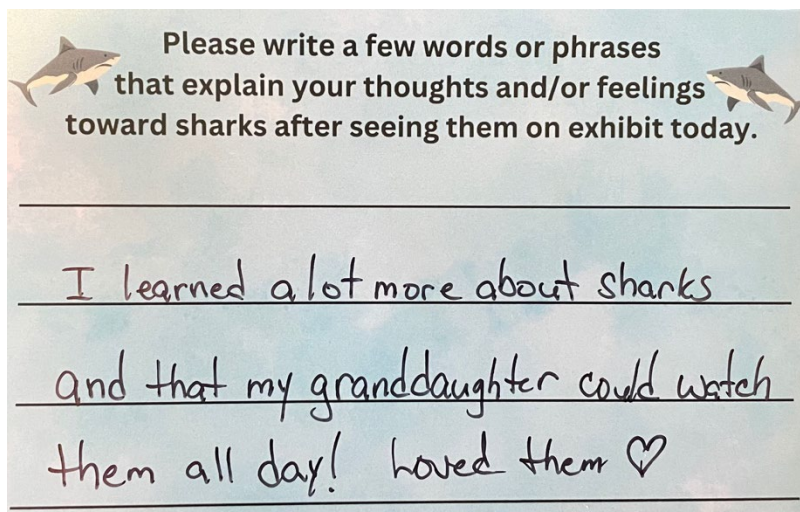
Appendix F: Additional Tables of Representative Quotes

Table F.1

Additional Representative Quotes per Sentiment

Sentiment	Representative Quotes
Positive	*" absolutely fascinating*
	"cool to see"
	"I really like them"
	"they have cool teeth"
	"we love Jaws!
Neutral	*"big size"*
	"Jaws"
	"alpha of the aquatics"
	"keep moving"
	"fin"
Negative	*"terrifying"*
	"why I avoid the ocean"
	"they would bite my hand"
	"scary teeth"
	"still terrified by the thought of getting bit by one!"
Mixed	*"love them; scared if they would bite me though"*
	"beautiful, but still think of Jaws"
	"graceful, but still afraid"
	"I love the ocean and swimming, but still don't want a shark to eat me"
	"awesome, but don't go in the water with them"

Table F.2

Additional Representative Quotes per Reflective Level

Reflective Level	Representative Quotes
Habitual Action (Nonreflective)	*" important to ecosystem"* *"Greenland sharks are cool"* *"powerful creatures of the sea"* *"scary; fun"* *"teeth are large and scary"*
Thoughtful Action	*"I love sharks! Seeing them up close is powerful"* *"We should have a peace treaty with them, or no swimming beyond 30 ft depth"* *"still scary, and still avoiding the ocean"* *"misunderstood animals with a bad reputation"* *"I learned a lot more about sharks. My granddaughter could watch them all day. We love them!"*
Reflection	*"intelligent, fascinating, ancient animals; they should be protected"* *"They have many senses and are very intelligent. People should stay out of their houses (oceans)!"* *"It's their world, and people should respect it more."* *"They are beautiful, amazing animals. I love them, but am still scared of the thought of getting bit by one "*

Appendix G: REFLECT Rubric Grading Criteria

Table G.1

REFLECT Rubric Criterion for Coding Level of Reflection (Wald et al., 2012)

Criterion	Level of reflection			
	Habitual action (Nonreflective)	Thoughtful action	Reflection	Critical reflection
Writing spectrum	Superficial descriptive writing approach (fact reporting, vague impressions) without reflection or introspection	Elaborated descriptive writing approach and impressions without reflection	Movement beyond reporting or descriptive writing to reflecting (i.e., attempting to understand, question, or analyze the event)	Exploration and critique of assumptions, values, beliefs, and/or biases, and the consequences of action (present and future)
Description of conflict or disorienting dilemma	No description of the disorienting dilemma, conflict, challenge, or issue of concern	Absent or weak description of the disorienting dilemma, conflict, challenge, or issue of concern	Description of the disorienting dilemma, conflict, challenge, or issue of concern	Full description of the disorienting dilemma, conflict, challenge, or issue of concern that includes multiple perspectives, exploring alternative explanations, and challenging assumptions
Attending to emotions	Little or no recognition or attention to emotions	Recognition but no exploration or attention to emotions	Recognition, exploration, and attention to emotions	Recognition, exploration, attention to emotions, and gain of emotional insight
Analysis and meaning making	No analysis or meaning making	Little or unclear analysis or meaning making	Some analysis and meaning making	Comprehensive analysis and meaning making

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to editor ▾

To Whom it May Concern,

I am utilizing 5 items from the "Self-reflection and Insight Scale (SRIS)" published in "SOCIAL BEHAVIOR AND PERSONALITY, 2002, 30(8), 821-836 © Society for Personality Research (Inc.)".

The title of the article I am taking the scale from is: "THE SELF-REFLECTION AND INSIGHT SCALE: A NEW MEASURE OF PRIVATE SELF-CONSCIOUSNESS" by Anthony Grant.

I am utilizing these items within my dissertation research, which will be published in Antioch University's Repository.

I spoke with S▮▮▮▮▮▮ from the Society for Personality and Social Psychology. He instructed that for permission, your policy was to fully cite "the name(s) of author(s), title of article, journal title (Social Behavior and Personality: An international journal), year of publication, volume and issue numbers (e.g., 45(3)), and page numbers (e.g., 540–550)" and send an email to this address to notify you.

All the best,

▮▮▮▮▮▮   **Nicole Conklin, M.S., M.A.**
         Instructional Specialist, PhD Candidate, Co-Design Fellow
▮▮▮▮▮▮▮▮▮▮▮▮▮

Permission to use Curiosity Scale:

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		End Page	383
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NEW WORK DETAILS

Title	Think On It: The Benefit of Reflection in Aquariums	Institution Name	Antioch University New England
		Expected Presentation Date	2023-12-19
Instructor Name	▮▮▮▮▮▮		

ADDITIONAL DETAILS

The Requesting Person/Organization to Appear on the License	Nicole Conklin

Permission to use REFLECT Rubric:

Permission to include pictures of Jenkinson's Aquarium's Atlantic Shark Exhibit and Signage from the exhibit:

Check In On Pictures of the Shark Exhibit External Inbox ×

Nicole Conklin - ███████████   Wed, Nov 8, 11:31AM (8 days ago) ☆ ↩ ⋮
to ████

Hi ████

I hope you are doing well. I'm emailing to ask a quick question about pictures I took of the shark exhibit and shark signage at the aquarium, that I'm trying to include in my dissertation.

Do you know if the aquarium has any rules about copyright on the text on the signage or general sharing of pictures of the exhibit? Before I try to publish in a journal, my dissertation itself is first being published online in open access and commercial databases, so I wanted to reach out to see the aquarium's policy on that and receive permission to use them if needed.

Thank you so much in advance... we're getting close to the end, and I can't wait to share with you what I found with the research!

P.S. I'm following along anxiously on Jenkinson's instagram to see what the surprise is!

All the best,

Nicole Conklin, M.S., M.A.
Instructional Specialist, PhD Candidate, Co-Design Fellow

D███████   Fri, Nov 10, 4:30 PM (6 days ago) ☆ ↩ ⋮
to me ▾

Hi Nicole!

Can you send me the pictures you want to use? We can take a look and get back to you. If they're ones we did then we don't have any copyrights, but I'm not sure on some of the pictures.

Thank you!

"*Inspiring a Sea of Change*"

D███████   Mon, Nov 13, 9:28AM (3 days ago) ☆ ↩ ⋮
to me ▾

You are good to go! They are not copyrighted. Thank you for giving me the opportunity to double check. Things, as I'm sure you can imagine, have been a little crazy here.

Can't wait to see it!

All the best,

"*Inspiring a Sea of Change*"