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HOW CAN ZOO EDUCATORS HELP INDIVIDUALS IN A COMMUNITY
DEVELOP A DEEPER CONNECTION TO WILDLIFE, CONSERVATION AND THE
ENVIRONMENT THROUGH SPECIFIC EDUCATION PROGRAMMING?

by

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A capstone submitted in partial fulfillment of the requirements for the degree of Master
of Arts in Education: Natural Science and Environmental Education.

Hamline University

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CHAPTER ONE

Introduction

Animal education is a means of teaching where learners interact with live animals (Fuhrman & Rubenstein, 2017). An increased number of educators in both formal (indoor classroom) and informal (outdoor, non-classroom) settings are incorporating animals (both living and nonliving/preserved) as a teaching tool to “enhance the delivery of an environmental message through engagement of the learners” (Newberry, Fuhrman & Morgan, 2017, p. 223). There is some controversy surrounding animal education and whether the benefits of this type of learning outweigh the impact it has on the animal itself.

Over the past 30 years, society’s views of using animals in an educational setting have changed. Those in support of animal education believe that the skills and experiences that are obtained in conjunction with using live animals are skills that could not be acquired by any other means (Edwards, Jones, Bird & Parry, 2014, p. 35). Through humane education, individuals develop positive attitudes and respect towards animals, in addition to the idea that a child’s development of kindness towards animals will ultimately transfer to a development of kindness towards other humans (Daly & Suggs, 2010, p. 102). On the opposing side of the argument, those adamantly against the use of live animals in an educational setting believe that the welfare of the animal is jeopardized, and that the same amount of learning can be acquired through literature and technology without the added use of the animal itself (“What’s the problem with classroom ‘pets’,” 2019).

I believe that animal education holds a very important and special place in the field of teaching, and feel as though using live animals in an educational setting is beneficial to both adolescent and adult learners. Through this capstone I will make a connection between animal education and individuals' views on wildlife and the environment. The first chapter of my capstone will narrate my journey and connection to animals, the environment, and education in both a professional and personal setting. I will introduce the topic to which I will study throughout this capstone and a rationale as to why this topic is of special significance to myself and others.

The focus of this capstone will be the relation between zoo education programming and the aspects of wildlife and environmental conservation. My research question is *how can zoo educators help individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific programming?* I will draw a connection between the importance of learning about animals in a formal setting, and how this knowledge and understanding helps to shape individuals' views about the natural world in a positive and respectful manner. I am very passionate about animals and the environment. I grew up spending much of my time outdoors and was fortunate enough to learn about animals from a very young age. I believe that this topic is very significant in the field of environmental education.

My Personal Journey

Beginning from as early as I can remember I have always been passionate about animals and the environment. I can recall countless experiences throughout my younger years of my family and I visiting a zoo, an aquarium, or a nature center. One specific

memory stands out: the first time I had ever seen a real elephant. Since I was a baby I had always adored elephants. I had acquired hundreds of various elephant toys and elephant stuffed animals growing up from gifts, stores, souvenir shops, you name it. I was mesmerized by their size. They were so powerful and yet so docile. So intelligent and majestic. Everything about an elephant was captivating to my childhood self. When I was 5 years old my parents took my brother and me to the Bronx Zoo in New York City. It was there that I saw a live elephant for the first time. I distinctly remember how unbelievable they were, like nothing I had seen in my library books or from my videos at home. I was fortunate enough to be able to see elephants in real life on many more occasions throughout my childhood and into my adulthood.

My interest in animals really thrived upon graduating high school, when I spent the following 6 years working at PetSmart as a pet care specialist. A pet care specialist's primary responsibility was to take care of all the live animals we sold in store. These animals included tropical fish, reptiles, amphibians, birds and small mammals. He or she would tend to the animals daily, cleaning habitats, providing food, water and enrichment, and educating customers interested in purchasing a pet. In this position, I really flourished and gained a deeper love and appreciation for animals. I adored caring for each and every living creature in that store. I found enjoyment in helping a customer find everything he or she needed to set up a habitat for a guinea pig: what size cage, what hay would be best, the fact that guinea pigs are extremely social/herd animals and thrive best in pairs or small groups. I loved the challenge of a customer bringing me in a water sample from their fresh water aquarium. My task was to conclude what the issue may be

and how it could be remedied. I loved to make little salads of romaine and shredded carrots for the parakeets and watch them intently pick apart the scraps in search of the best pieces. I had always known that I was passionate about educating and I had always loved animals. The opportunity to do both felt like the complete package. My job experience at PetSmart allowed me to see that animals could be facilitated as more than just an object for fun and pleasure, but as a medium for learning and inquiry, and a connection to the environment we share together.

When thinking about my younger perceptions of working with animals, zoologists and veterinarians were the only occupations that came into my mind. I did not feel intelligent or financially stable enough to pursue one of these paths. Furthermore, I was also passionate about teaching, so I went into the direction of elementary education. I spent time throughout my 4 years in college working in different classrooms and educational settings. I spent time in a special education 8-1-1 classroom working with 2nd and 3rd grade children with emotional and behavioral disabilities. An 8-1-1 classroom is 8 students with one classroom teacher, as well as one aide. I worked in a kindergarten general education classroom and a reading classroom for 3rd grade. I worked in an 11th and 12th grade 8-1-1 classroom with students with emotional and behavior disabilities, as well as a general education 4th grade classroom. All of these experiences were extremely meaningful and rewarding for me and my degree pursuit. I gained a plethora of knowledge and insight regarding the field of education. I became comfortable with all aspects of teaching including classroom management, lesson planning, evaluation, assessment, and collaboration with other educators. I graduated from St. Bonaventure

University after 4 years with many skills I felt were needed to be the best elementary education teacher I was capable of being.

However, when I graduated from college, I felt some disconnect. Something was missing. While I loved my experiences, I felt as though there was some little incomplete aspect of my life that elementary education had not given me in entirety. With this conundrum in the back of my brain, I decided to pursue a job as an early childhood education teacher. I had done so much work with elementary and special education students in college but I had never worked with young children. I knew that early childhood education was vastly different from all that I had encountered before but I thought that perhaps this may be my true niche, so I obtained a job as an early childhood educator, specifically for pre-kindergarten. I worked at this job for 3 years, then left the facility I was at to continue working as an early childhood educator for another 3 years for a different company. During this time I had many of the same responsibilities I did when I was obtaining my degree in elementary education. I was planning and implementing curriculum. I was intervening and addressing behavioral problems. I had developed classroom management skills. I also learned new teaching techniques that I had not dealt with before, such as working with students on fine motor skills like holding a pencil, gross motor skills like throwing a ball with bendable arms, and self-help skills like zipping up a zipper. All the while working in early childhood education I was passionate about going back to school to receive a master's degree. I struggled for years to decide what avenue I wanted to pursue for my graduate work. Do I continue elementary education? Do I focus my studies on early childhood education? I felt unsure

and hopeless. Then, by happenstance, I came across an online program at Hamline University that specializes in environmental education. This degree and concept were all completely new to me. I had never heard of this particular field. I wasn't sure what jobs were available for someone with this type of degree. However, I delved more into the program and realized that this was exactly what I had been looking for.

Environmental education is an appropriate balance of my most meaningful passions, i.e. teaching and nature. As an adult, I continue to share a connectedness with nature and the environment. In the summer I venture to northern Connecticut into wooded landscapes, and up to Lake George in New York state to camp. Often throughout the warmer months of the year in Connecticut, as well as sometimes in the colder of months, I can be found along a hiking trail somewhere in Connecticut, southern Massachusetts, or eastern New York State. I have scaled up high elevation climbs, such as Mount Monadnock in New Hampshire, and have done long distance hikes along segments of the Appalachian Trail. In addition to hiking, I often enjoy floating on a lake or a pond in my kayak with the cool water splashing droplets onto my body with each paddle. I have a hybrid bicycle which I use to ride on many of the pathways reconstructed from railways in the state. The trails are beautiful and pristine, in the heart of the wilderness. The wind blowing in your face and the smell of trees and plants floating into your nostrils. Being outside in nature, I feel like I "belong." Everything feels right. These moments make me feel connected to the natural world. They help me to understand the importance of the air we breathe, the water we drink, and the ground we walk on. These moments also help me to understand the significance of these elements to all of the

animals that share our world with us, as well as the importance of taking care of our earth. It is through education that we come to learn how we can make the difference.

Animal Education

During the spring 2019 semester, I worked as an educational programming intern at Connecticut's Beardsley Zoo. Connecticut's Beardsley Zoo is the only zoo in the state that is accredited by AZA, the Association of Zoos and Aquariums. This accreditation means that Connecticut's Beardsley Zoo has standards that must be upheld, many specifically related to the welfare of the animals in their care. The programming department works to provide educational programs both on and off zoo grounds. At Connecticut's Beardsley Zoo there is a Research Station which provides a classroom environment for educating. The education programming department also travels off grounds to deliver programs in a variety of settings including elementary and secondary schools, girl and boy scout programs, early childhood education centers, senior centers, libraries, fairs, festivals and many more. The purpose of the education department is to educate and inform about animals and to share an understanding and mutual respect for nature through learning and education. During these programs zoo staff bring different artifacts to share with groups, such as fossils, pelts, skins and models. They also facilitate live animals during the programs including reptiles, amphibians, small mammals, birds and invertebrates. Individuals are allowed to manipulate artifacts, as well as touch animals. It gives individuals the opportunity to learn and explore in a unique way. I have such passion and excitement being at my internship every week. I feel connected to what I do and the mission of Connecticut's Beardsley Zoo. My contribution to animal

education programs at Connecticut's Beardsley Zoo is helping guests create a relationship to local and exotic wildlife, as well as providing guests with the knowledge and means to act upon conservation efforts and positive environmental practices.

Capstone Topic

My research question is: *how can zoo educators help individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific education programming?* I feel that zoo educators have an important job to reach their audience and help to develop a deeper understanding and appreciation for animals and the natural world. I believe that by gaining information and insight regarding wildlife, conservation and the environment, individuals are given the tools necessary to make informed decisions with regard to respecting our earth and the animals that inhabit it.

Conclusion

Chapter 2 will contain a literature review with articles related to zoo education and programming, conservation, animal welfare/humane education and environmental studies. This literature review will assist in supporting my views on the importance of zoo education, as well as the connection it has to animal-human relationships and conservation. Chapter 3 will provide an overview of my capstone project. This overview will detail the components of my project including standards and curriculum description, the research associated with my curriculum, as well as the setting and participants. Chapter 4 will contain a summary of what I have learned throughout my capstone project.

I will review my research and literature, discuss project limitations, and possible project endeavors and professional development in the future.

CHAPTER TWO

Literature Review

Introduction

Education serves many purposes in our lives. As a child, education helps us to develop preliminary skills such as the ability to recognize alphabet letters, to verbally construct letter sounds, to count a handful of blocks, or to understand two primary colors mixed together create a secondary color. All of these skills are the foundations for our being; they are the stepping stones for all of the intellect we will develop for the remainder of our lives. As we grow and mature mentally, education follows alongside us throughout our lives. Education continues to stack new building blocks of information onto our repertoire, one after another, as we ascend through our primary and secondary grades. After high school, education takes on a new purpose. It is at this point in our venture of life that we are able to make an independent and collective decision as to what avenue of education we wish to pursue.

We are capable of deciding what specific learning we care to partake in further, be it learning of the arts, of science, of math, business or technology. The options are endless for us. We have all the skills that we need to obtain, store and successfully use this information once we learn and feel comfortable with it. We will become a product of what we gather. Education is so important for our future and our connection to everything around us, helping us to perceive things in a new and meaningful light. Zoo animal education is one avenue of education that is worthwhile for our future and connection to the natural world we inhabit. My research question is *how can zoo educators help*

individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific education programming? In chapter two I will discuss the importance of zoos in our society today, animal education as a teaching strategy, and the connection between informal education and the zoo experience. Additionally, the topics of wildlife conservation and environmental awareness will be defined as well as connected to animal education in a zoo setting.

The History of Zoo Education

There are endless avenues for education. One avenue is zoo animal education which is the premise of teaching about domestic and exotic animals in an informal setting. Zoo animal education often incorporates artifacts as well as hands-on experiences to foster deeper learning. Zoos create a great experience for visitors incorporating education into many aspects of the visitor experience. “Zoos have a very long history- keeping wild and exotic animals captive occurred in ancient Greek and Roman times. Watching captive, often charismatic, exotic and/or endangered nonhuman animals is still a popular activity” (Ojalampi & Nygren, 2018, p. 234). “More than 600 million people – approximately 10% of the world’s population- visit over 1,300 zoos and aquariums throughout the world annually” (Packer & Ballantyne, 2010, p. 25).

Beginning as early as the 1960s zoos have been shifting their focus from a primarily recreational experience to one that is rooted in education and conservation, as well as the well-being of the animals on exhibit (Ojalampi & Nygren, 2018, p. 234). In 1969 major zoos such as London, San Diego and New York began incorporating educational experiences for schools right on their grounds, providing programs, lectures

and tours by trained staff (Conway, 1969, p. 48). Other large zoos such as Chicago and Philadelphia implemented “zoo mobiles,” which allowed zoo educators to bring animals and other learning materials to different educational establishments (Conway, 1969, p. 48). Even the idea of using zoos as a motivational stimulus to connect urban children to the environment was at the forefront, although no concrete programs had been put into place yet (Conway, 1969, p. 48).

Throughout the 1960s and up through the 21st century, animal welfare and education continue to be at the forefront of zoos’ missions. “The strategic reinvention of zoos as conservation organizations was essential for their future” (Ojalampi & Nygren, 2018, p. 234). Zoos continually provide visitors with many formal and informal learning opportunities. School field trips are more prevalent than ever. School teachers often prepare pre and post trip lessons to facilitate and reinforce learning. Youth groups will partake in a guided tour around the zoo, an educational class, or even an animal encounter. As an adult, learning experiences are also available and help to gain knowledge about the importance of zoos in our community, as well as their connection to conservation and the environment. Zoos hire paid educational staff, volunteers and docents to provide educational programs for visitors, animal demonstrations, information about conservation and exhibit lectures (Packer & Ballantyne, 2010, p. 25). As zoos progress through the 21st century, their role in the field is continually shifting and moving farther away from an entertainment standpoint to one of inquiry and environmental change (Gross, 2015, p. 391). This transition into an educational framework coincides with zoos increased concern for critical environmental issues.

In addition to an increased interest in education, zoos are progressively taking an active role in global issues. One such example is climate change (Gross, 2015, p. 392). At zoos, lessons about climate change are developed with an aim to give visitors a comprehensive view of the problem, as well as viable solutions (“Aquariums and zoos team up to teach climate change,” 2017, p. 8). Climate change is, unfortunately, a difficult issue to address, but zoo educators are doing their best to appropriately educate the public. “One of the things that is often daunting about climate change is that it’s really complex. It’s a very complex, confusing issue to understand. It’s not like poaching elephants for ivory. That’s pretty linear” (“Aquariums and zoos team up to teach climate change,” 2017, p. 8). The unfortunate truth is that global issues will always be just that: issues. Furthermore, even with knowledge of environmental concerns and the tools necessary to alleviate these issues, other problems often lie in the mix, such as political agendas (Hudson, 2001, p. 283).

Looking towards a more favorable aspect of this situation, as society and technology progress, so too will the resources necessary to address global issues appropriately. While zoos work diligently at conveying messages of environmental concerns, they are working equally hard to convey another message: the importance of the welfare of animals in their care. “Ensuring a high standard of zoo animal welfare is important for both ethical and legislative reasons” (Wolfensohn, Shotton, Bowley, Davies, Thompson & Justice, 2018, p. 1).

Animal Welfare

Historically, animal education has primarily focused on the idea of animal welfare. In a zoo setting, animal welfare is defined as the animal's physical health, if it has a long life, and the rate of reproduction (Wickins-Drazilova, 2006, p. 27). The history of animal welfare is extensive. "Animals have always had welfare but what humans know of it has become modified over time" (Bloom, 2011, p. 122). Much of the idea of welfare was dependent on factors specific to the society. For example, in many instances, the idea of harming something else had much to do with whether another individual would know about the harm or not. Animal welfare became more of a mainstream idea beginning in the 1960's. Several books were published by various authors that highlighted animal welfare, specifically in the production industry (Bloom, 2011, p. 124). Very recently, the topic of conversation has moved beyond animal welfare in the sense of whether or not animals should be killed, to animal welfare in the sense of what happens before an animal dies, including their care and quality of life (Bloom, 2011, p. 124). In 2019 animal welfare remains an important aspect of the mission of zoos.

As we move into a more progressive society many additional elements of animal welfare have come into the forefront within zoos. Examples of these additional considerations include what behaviors are deemed to be normal vs. abnormal behaviors related to the specific species, freedom and choice, and dignity (Wickins-Drazilova, 2006). Physical health of an animal is an important aspect of welfare. In a zoo setting, good physical health can be deemed as an indication of the welfare of an animal. Zoos are staffed with many veterinarians that are specifically trained in the field and have all

the necessary means to ensure animals are healthy. In contrast, this can be a difficult task, as it can be hard for zookeepers to recognize pain in animals, especially if there are no obvious visual signs (Wickins-Drazilova, 2006, p. 28). In addition, because many zoos house animals in close proximity to each other, it is not uncommon for infections and parasites to spread rapidly throughout the zoo (Wickins-Drazilova, 2006, p. 28). Zoo staff members are trained to provide animals with the best care possible despite these difficulties. However, the fact of the matter is that even though these obstacles exist, animal welfare in a zoo is of utmost importance.

When referring to animal education, welfare continues to be a top priority. When animals are incorporated into an educational setting, it is the responsibility of the educator to discuss the welfare of the specific animals, where it came from, and when it will be returned (John & Roger, 1994, p. 48). Additionally, when educators use live animals to teach, their interaction with the animal helps to model positive handling and interactions (John & Roger, 1994, p. 48). Furthermore, it is a fact that much of the inhumanity that is brought about onto animals is done so through negligent pet care. An educator has the opportunity through his or her program to help convey the message of responsible pet ownership and care by providing guests with advice and facilitating discussion (John & Roger, 1994, p. 48). Welfare and education coexist in a zoo setting and together show the significance of caring for and learning about domestic and wild animals.

Avenues of Animal Education

Animal education itself is not limited to zoos and occurs in a variety of formal and informal settings including classrooms, animal parks, aquariums, marine parks, environmental education centers and conversation centers. In a formal setting, such as a primary school, secondary school, or college, educational standards and specific learning aims are stated (Kummer, Randler & Wilhelm, 2012). Captive live animals used for education in a formal setting “can enhance learning, strengthen feelings of empathy and compassion, and build skills in responsibility” (Fuhrman & Rubenstein, 2017, p. 223). An informal setting is one in which specific educational outcomes are not stated (Kummer, Randler & Wilhelm, 2012). Informal environmentals are outdoor and non-classroom settings. A zoo is an example of an informal learning environment. In a zoo setting, many zoologists, zookeepers and marine mammal trainers will incorporate elements of education into their work (Kramer, 2018). Zoo animal educators work to deliver information in a variety of contexts which include formal lectures, guided tours and in front of exhibits (Kramer, 2018). Zoo animal educators will often create educational materials to coincide with their teaching. These materials may include posters, handouts or videos. In this informal environment, “animals used as teaching tools can enhance the relevance of local conservation efforts targeting specific species and habitats, as well as increase attendance at program activities (Fuhrman & Rubenstein, 2017, p. 223). Within the zoo community, an influential organization that is the leader in animal education, welfare and conservation efforts is the Association of Zoos and Aquariums.

The Association of Zoos and Aquariums. Within the United States and across the world there are 230 different institutions that make up the Association of Zoos and Aquariums (“About Us,” 2019). This non-profit organization helps to advance the mission of zoos and aquariums through their commitment to providing guests, animals, and zoo staff with the latest in education and science advances in the field (“About Us,” 2019). AZA strives to be at the forefront in animal conservation, conservation education, and professional leadership (“About Us,” 2019). “Every year, AZA spends roughly 220 million dollars on field conservation, supporting 2,600 projects in 130 different countries” (“About Us,” 2019). Additionally, AZA’s conservation education efforts have provided field-specific training for 40,000 teachers yearly, offering educators the top methods for teaching in a zoo or aquarium setting (“About Us,” 2019). Animal education is certainly not limited to AZA-accredited facilities, but it is not incorrect to say that AZA-accredited facilities are at the forefront of animal education and conservation. By following stringent and top-of-the-line standards, these AZA facilities are ensuring that individuals are receiving the best educational experience possible. Furthermore, these standards give educators the resources and opportunities available to ensure that these experiences connect to current issues, such as conservation and environmental awareness.

In addition to AZA’s commitment to be a world leader in animal education and conservation, AZA works to continually create and maintain rigorous standards related to the care and welfare of animals within accredited institutions. These standards include the best practices in professional development, veterinary care and husbandry. The mission statement of AZA’s Animal Welfare Committee incorporates an understanding of what

animal welfare is in a zoo setting, while striving to provide institutions with the resources to identify and apply best practices in animal welfare. Additionally, the mission statement includes AZA's commitment to: continually developing assessment tools for advancing and monitoring welfare, providing individuals with the appropriate training and education to apply assessment tools effectively, and positively influencing public perception regarding animal welfare ("Animal Welfare Committee," 2019).

Formal vs. Informal Learning

Zoo education is considered to be informal learning because there are no set standards or specific educational outcomes, but rather general goals (Kummer, Randler & Wilhelm, 2012). Additionally, "there is not a wealth of studies on zoos as a source of formal learning in a school setting" (Kummer, Randler & Wilhelm, 2012, p. 385). However, there are studies that create a link between informal education in a zoo setting and formal education in a school setting. In 2011, Kummer, Randler and Wilhelm completed a study in adolescent learning at the zoo and the link between a non-formal learning environment and teaching formal aspects of biology. Kummer, Randler and Wilhelm discussed learning outcomes of different ventures in a zoo setting, with the first being zoo field trips. Field trips are meant to provide students with an educational experience. The purpose they serve is to "enrich school curriculum, make connections to what students are learning in school, and provide students with meaningful educational experiences." (Matthews & Scott, 2011, p. 29). However, zoo field trips are very often entertaining and recreational in nature. Teachers find themselves having a difficult time making appropriate educational connections and balancing free opportunity for students

to explore exhibits with rigid constraints for learning (Matthews & Scott, 2011). One suggestion to ensure the zoo field trip experience is an appropriate balance of education and recreation. Planning a pre-trip to the zoo is helpful for this balance. In this way, teachers have the opportunity to decide what will be appropriate and reasonable for students to be able to accomplish during the trip. Teachers can try different activities, assess time constraints, and construct a timeline for a suitable day. Moreover, from this visit teachers will be able to gather information which they can use to make a connection to learning back at school (Matthews & Scott, 2011). Teachers may even plan to schedule a guided tour by a zoo education guide or docent if it is available (Kummer, Randler & Wilhelm, 2012). Zoo field trips are capable of being both entertaining and educational.

Kummer, Randler and Wilhelm's study assessed the impact of a visit to the zoo on learning and retention within four groups. The first group, the control group, had no instruction and had an unstructured zoo visit. The second group visited the zoo and received instruction with a teacher-centered presentation, i.e. a zoo guide. The third group received learner-centered work, but with a teacher summarizing information at the end. The final group received learner-center worked with a peer tutor summarizing the results. The results of the study indicated that "the visit to the zoo resulted in an increase in learning and retention and it provided a very high effect in comparison to an unstructured zoo visit" (Kummer, Randler & Wilhelm, 2012, p. 388). These results were in terms of a formal educational setting. Kummer, Randler and Wilhelm's (2011) study found the following:

Concerning the best teaching strategy in a zoo, our results encourage different options; on the one hand they show that a zoo-guide tour is highly effective with respect to short-term learning, whereas the student centered work based on self-determination theory produces the highest long-term learning outcomes. Even more interesting is the observation that the zoo-guided group also produced a high and sustainable knowledge. Therefore, zoo-guide tours should be designed in accordance with modern aspects of teaching and learning. (p. 289)

According to Matthews and Scott (2011):

The zoo can be used not only as a place for exploration and creating curiosity in students. Through the use of engaging, hands-on activities, students can begin to explore their ideas about wild animals and build on these ideas both before and after a zoo field trip. (p. 38)

Zoos are increasingly becoming a place to learn and become passionate about animals, conservation, and the environment. “Education in modern zoos must be more than showing the animal in a ‘naturalistic’ enclosure with accompanying signage detailing basic natural history information” (Fa, Funk & O’Connell, 2011, p. 225). Informal educational programs in a zoo setting are a valuable way to deliver a quality learning experience that is both enjoyable and purposeful. “Developing appreciation of wild animals is an integral part of efforts by zoos to increase environmental awareness and to gain support for worldwide conservation” (Fa, Funk & O’Connell, 2011, p. 220). While zoos strive to bring about an informative and positive experience for their guests, the

unfortunate aspect remains that zoos are consistently coming under scrutiny with respect to the welfare of the animals in their care (Wickins-Drazilova, 2006, p. 27).

The longevity of captive animals. A heavy debate regarding welfare in a zoo setting is an animal's lifespan. There is the impression that animals live longer in captivity than they do in the wild. This argument favors captivity because of the removal of natural predators, the idea of having the "perfect" environmental conditions and having top of the line diets and veterinary care. However, the opposing argument insists that animals in captivity have shorter lifespans because they are lacking certain natural behaviors, do not have as much space to live in, and are void of freedom and enrichment they would otherwise have in the wild (Wickins-Drazilova, 2006, p. 28). In truth, finding these statistical numbers is hard. "It is difficult to accurately determine dates of birth and death of all members of a special population. By comparison, zoos meticulously record births and deaths of animals in their care" ("Most mammals have a greater life expectancy in zoos," 2016). In a study done by the University of Lyon and the University of Zurich, 50 mammal species were assessed for life span in captive and wild settings. According to the study, scientists discovered that of the 50 mammal species studied, over 80% lived longer at the zoo than in the wild. This was consistent with species such as African buffalos, reindeer, zebras, beavers and lions. "Longevity at the zoo was particularly prominent among small species having a generally shorter life span, such as tree shrews, weasels, white tailed deer and African wild dogs" ("Most mammals have a greater life expectancy in zoos," 2016).

However, according to an article by ABC News, researchers in European zoos compared the life span of their elephants with those in Amboseli National Park in Kenya. The results of the study found that the average lifespan for African elephants in the European zoos was 16.9 years, compared to 56 years for elephants in the national park in Kenya who died of natural causes (Schmid, 2008). If statistics were added for African elephants that were killed by poaching in Africa, the life span dropped to 35.0 years, but was still significantly higher than their captive counterparts in Europe (Schmid, 2008). One positive aspect of this study stated that life spans of zoo elephants have increased over the years, indicating that there is an improvement in the care of elephants in captive settings (Schmid, 2008).

Similar to life span, reproduction in zoos is said to be an indicator of zoo animal welfare. The thought is that the zoo is a good facility if the animals breed successfully and often. If the zoo has a low rate of reproduction, there may be an underlying concern related to the animal's welfare. However, even with these arguments the question still remains: is a high level of reproduction a good indicator of animal welfare in a zoo? (Wickins-Drazilova, 2006, p. 29). With this thought process, another question comes to consideration: should a zoo cull if animal welfare cannot be maintained? (Wickins-Drazilova, 2006, p. 28).

Culling. Culling in a zoo is defined as the process by which animals are segregated into specific groups based on desirable or undesirable characteristics. Often times, the process of culling will end with the “undesirable” animals being killed (“EAZA culling statement,” 2015). While culling in zoos in the United States is not

extremely prevalent, it is a topic for discussion amongst zoos in other countries. In Denmark, culling is commonplace. According to an article by National Public Radio, the Odense Zoo in Denmark has been culling for over 20 years. Primarily, Odense Zoo will often kill lions they deem to be surplus and will dissect them in front of the public (King, 2015). “Managing breeding programs and the putting down of surplus animals helps us to ensure a healthy population of the very animals which are close to extinction in the wild” (“Practice of culling animals,” n.d.). This practice has been commonplace throughout Europe and is supported by the European Association of Zoos and Aquariums (EAZA). “Culling of animals is one of a range of scientifically valid solutions to a long term genetic and demographic sustainability of animal populations in human care” (King, 2015).

Is captivity the best option? This question is certainly a hot button issue and there has been much research on the topic, in addition to an individual’s personal beliefs about whether wild animals should be in captivity at all. The Animal Welfare Institute makes a compelling argument that marine animals are not well suited to live in captivity, because of their complex social nature (“Confinement of marine mammals,” 2011). The main concern for marine animals such as whales and dolphins being in confined areas is that they do not have the room and resources to carry out natural behaviors such as swimming far distances daily and interacting with other marine animals. It is true that in the 21st century technology is far more advanced and specialists in the field of marine life, such as scientists and biologists, are better equipped to ensure that species are receiving the best care and environment possible. The fact is that captivity for many

species remains the best viable option for “public education, scientific research, conservation of endangered species and non-conservation related justifications such as contribution to the local economy and cultural value” (Fa, Funk & O’Connell, 2011, p. 100). It is essential for the public to be informed and aware that captivity is not unnecessary, and that zoos are taking the necessary steps to ensure that the animals in their care are there for an important reason. Part of this rationale lies with the mission behind the Species Survival Plan (SSP). SSP programs oversee population management of specific species within AZA accredited facilities, such as zoos and aquariums. In addition, these programs seek to enhance conservation efforts of these specific species within the wild. Efforts include species conservation, research, husbandry, management and educational initiatives (AZA Wildlife Conservation and Management Committee, 2011, p. 7). Without the SSP and zoo’s conservation efforts, it is very plausible that animals can become endangered or extinct. Education programs at zoos are designed to inform the public of how SSP programs and zoo’s mission work cooperatively for the benefit of the animals in their care (“Animals & conservation,” 2019).

Wildlife Conservation

There is a direct link and understanding that animals in a zoo setting are there for a meaningful purpose. This purpose is to provide guests with the ability to see animals in which they would not otherwise be able to see. More importantly, zoos work to save animal species that are close to extinction and ensure that animal species that are not endangered never reach that point (“Conservation,” n.d.). “Modern zoos want to be known for their conservation efforts and education” (Ojalammi & Nygren, 2018, p. 233).

This process is achieved through wildlife conservation, or the act of protecting wildlife, wild habitats and attempting to boost numbers of species that are endangered and critically endangered. Educating guests about the importance of wildlife and their habitats is a key way to extend the message of conservation. “Often conservation education is seen as a subset of environmental education, concentrating on the conservation of nature, endangered species and biodiversity” (Ojalammi, & Nygren, 2018, p. 235). The connection between wildlife conservation and animal welfare is the idea of providing the best quality and care to animals in a zoo setting to ensure that longevity of the species itself. Furthermore, zoo education provides adolescents and adults with the knowledge and skills to take part in wildlife conservation themselves and shows why animal welfare is so important in a zoo.

Environmental Awareness

The key to wildlife conservation is environmental awareness and sustainable thinking, or the understanding that our environment is a fragile and dispensable place and that we must make educated decisions that do not cause negative consequences for current or future generations (Deniz, 2016, p. 71). It is imperative that the environment be protected and cared for to the best of our abilities and knowledge (Schupak, 2019). Much of environmental awareness revolves around the educating of individuals about our environment itself, what problems exist, and what we can do to alleviate these issues. While there are dozens of environmental threats that impact our world today, some more than others have a direct effect on wildlife. Some examples of these threats are:

- Bycatch: the accidental capture of a species not intended to be caught, such as marine turtles, dolphins or seabirds (“Bycatch,” n.d.).
- Deforestation: the removal of trees and therefore animal habitats. 80% of land-based species in the world live in forests. Deforestation is even more prominent of a concern in tropical rainforests because of the biodiversity that exists in this particular habitat (“Deforestation and forest degradation,” n.d.).
- Climate change: ocean waters are becoming warmer, which is an issue for the marine animals that inhabit these waters. Additionally, intense droughts threaten crops and freshwater supplies that wildlife depend on (“Effects of climate change,” n.d.).
- Pollution: air, land and water pollution negatively affects wildlife habitats. Pollution causes destruction to otherwise pristine landscapes, as well as contaminants soil and waters and can kill animals (“Pollution,” n.d.).
- Infrastructure: similar to deforestation, infrastructure involves creating physical structures that help develop communities, but conversely have a negative effect on wildlife (“Infrastructure,” n.d.).
- Oil and gas development: oil and gas have been critical resources for our planet, but the exploration for these resources underground has caused significant disruption of migratory pathways, as well as oil spills and degradation of animal habitats. “In Africa, only 17% of the gorilla population currently lives in protected regions, and vast areas of gorilla forest have already been lost as oil and gas industries, along with logging companies, move in gorilla territory” (Oil and gas development,” n.d.).

These environmental issues are all very serious concerns in the 21st century (Matson, 2001). They are all affecting our wildlife in different and often irreversible ways. The key to environmental awareness: education (Singh, 2013). If we are able to educate society regarding the negative impacts these issues have on our planet, we create a sense of understanding about the topic itself, and an urgency to help eradicate the situation as soon as possible.

Environmental Education Challenges

With appropriate environmental education, zoo educators are able to reach their intended audience and provide meaningful information. The issue with the appropriateness of the education is not necessarily if the educators are knowledgeable in their content, but rather if the learners are interested in the material. “Although conservation education is an accepted part of the mission of modern zoos and aquariums, it is not usually at the top of most visitors’ “to do” list for their day at the zoo” (Packer & Ballantyne, 2010, p. 25). There has to be interest in the material or there is no motivation to learn. “Environmental education, a vital component of efforts to solve environmental problems, must stay relevant to the needs and interests of the community and yet constantly adapt to rapidly changing social and technological landscape” (Hudson, 2001, p. 283). How do zoos create this “interest” and “motivation?” It is somewhat difficult for several reasons. One reason is that a zoo is an informal learning experience. The learning experience is entirely voluntary and is directly related to the interests of the learner. This type of learning is referred to as “free-choice learning” (Packer & Ballantyne, 2010, p. 26). Since learning in a zoo is “free-choice” it can be difficult to reach the intended

audience and to keep them stimulated and engaged in the material. More often than not, the experience becomes “learning for fun” (Packer & Ballantyne, 2010, p. 26). In a “learning for fun” situation, the intended outcome of the experience is to be entertaining, regardless of whether it becomes an educational learning experience as well. There is the possibility that the experience can be the best of both worlds, i.e. fun and educational, but this is relevant to the interest of the participant. Other reasons why creating interest and motivation to learn at a zoo is difficult are that visitors are only in the zoo for a few hours. There is very little formal structure to tap into prior knowledge and reinforce learning. The criteria for learning may not be diverse and reach certain demographic audiences. Furthermore, guests may choose to disengage from learning at any point in their visit (Packer & Ballantyne, 2010, p. 27).

A study completed by Ojalampi and Nygren in 2018 at Helsinki Zoo assessed how visitors were being engaged in nature conservation themes, and if they were taking away anything meaningful from the experience. The study indicated that although conservation education was at the forefront of Helsinki Zoo’s mission, results indicated that the idea of conservation was “abstract and distant for visitors” (Ojalampi & Nygren, 2018, p. 243). Visitors were able to understand the material presented regarding conservation, and see the relevance of the material, but the material itself did not have a sizeable impact on the lives of the visitors or choices they will make in the future. Zoos are still struggling to find the appropriate balance between recreation and learning. As society continues to change and environmental awareness moves to the forefront of public concern, so will zoos (Ojalampi & Nygren, 2018, p. 243).

A more considerable way in which educators can engage guests in a meaningful, fun and educational experience is through wildlife encounters. Wildlife encounters occur at the zoo and are an opportunity for individuals to interact directly with wildlife (“The importance of animal encounters,” n.d.). Through these experiences, individuals are able to build knowledge about an animal they would not otherwise be able to obtain through books or technology. Furthermore, individuals can develop a connection to the animal in a positive way, a connection of respect, responsibility and love for the animal and its home (“The importance of animal encounters,” n.d.). “The aim of conservation education is to interpret living collections to attract, inspire and enable people to act positively for conservation” (Packer & Ballantyne, 2010, p. 27). Packer and Ballantyne (2010) completed a study regarding visitors’ environmental learning in zoos and aquariums, and what factors influenced their learning and retention of information. In their study, Packer and Ballantyne identified specific features of zoos that facilitated visitors’ learning and increased the likelihood that visitors would take environmental action post-visit. The study concluded that those that come to the zoo already with knowledge and interest regarding environmental awareness are more prone to take away information from the experience. This learning will continue to build and develop after each additional visit, if in fact the individual is motivated to learn (Packer & Ballantyne, 2010, p. 30). The question is: what happens to those individuals that visit the zoo and do not already have knowledge or interest regarding environmental awareness? As a zoo educator, these individuals are equally as important to reach and this situation becomes a vital

opportunity to create an in depth and meaningful learning experience that will allow these individuals to gain the knowledge and interest they would not otherwise have.

Conclusion

To summarize, education has been and will continue to be of utmost importance in our society. In a zoo setting, animal education provides the opportunity to gain an experience that is both recreational and informative in nature. Educating publicly about animals in an informal setting such as a zoo gives both children and adults the ability to understand wildlife and the world they live in, as well as gain a better understanding of environmental awareness and what measures can be taken.

In chapter 3, I will use knowledge and resources from my literature review, as well as personal and professional experiences, to develop an educational curriculum for zoos that incorporates relevant learning experiences on-grounds coupled with “post-zoo” opportunities to further learning beyond the zoo experience. Scott and Matthews (2011) shared a compelling article regarding “The Science Behind a Successful Field Trip to the Zoo.” The article discusses findings related to field trips to the zoo, which while intended to be educational experiences, are primarily recreational (Scott & Matthews, 2011, p. 29). Scott and Matthews offered suggestions for making the zoo trip a more educational experience. One suggestion involves “post-zoo” activities. These activities involve individual and group work that incorporate elements from the trip and reinforce learning back in a school setting, helping to foster connections between the zoo and home (Scott & Matthews, 2011, p. 34). In a formal education setting (classroom-based with trained teachers (“Formal vs. Informal Education,” 2002) post-zoo learning is widespread.

However, there is not much curriculum and resources available regarding post-zoo learning in an informal setting, such as a family's weekend visit to a zoo. The educational strategies put into place at the zoo are exceptional for learning and gaining appropriate and factual information about animals and environmental conservation.

The curriculum I will develop in Chapter 3 will function on a monthly basis. The curriculum will have a different theme or topic each month. Each month the topic will incorporate a zoo program on grounds (e.g. hands-on experiences, discussion, individual and group activities, etc.). In addition, the curriculum will incorporate "post-zoo" opportunities that individuals and families can take back home with them. Examples may include research projects, library visits, an endeavor in the community, a technology project, etc. Through this curriculum, I hope to give individuals and families a meaningful zoo experience which can be extended to a meaningful experience in their own community. Moreover, through this curriculum individuals can gain a positive perception of wildlife and their zoo visit experience, taking away from the zoo the means and resources to understand, connect with, actively participate and make a difference in their own community.

CHAPTER THREE

Project Description

Introduction

Literature has shown that zoo education programs are working to teach with and about wildlife, the environment and conservation. The question is: how are these educators helping guests to develop a connection between these three equally important and connected topics? This chapter provides a description of my capstone project and formulates a connection to my research question of *how can zoo educators help individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific education programming?* Included in chapter three are Connecticut Next Generation Science Standards for my curriculum, research that supports my project approach, the setting and participants for my unit, and how I will assess learning outcomes.

Project Description

I have developed a unit that will be facilitated in a classroom-style setting at Connecticut's Beardsley Zoo. This unit is comprised of 6 individual programs approximately 45 minutes in length. Each program focuses on a different animal, or group of animals. Additionally, these programs will incorporate ambassador animals, which are live animals that are used as ambassadors of educational messages. These animal ambassadors help guests to shift from being aware of environmental issues regarding wildlife, to being given all the necessary resources to take action to address these issues (Fuhrman & Rubenstein, 2017, p. 226). The educational programs presented

will make a connection to conservation and the environment. For example, in addition to exploring a specific animal, the program may include information about the animal's habitat and what environmental issues the animal may face on a daily basis. These environmental issues will be discussed in terms of the problem, as well as viable solutions. Artifacts, technology and other materials/resources will be facilitated. Furthermore, each program will conclude with a "post-zoo" experience, i.e. an opportunity for a project at home or in the community. These experiences are directly correlated to conservation and environmental awareness. Materials and resources will be available to take home. My unit will follow Connecticut Next Generation Science Standards for grades K-2 (NGSS Lead States, 2013):

K. Interdependent Relationships in Ecosystems: Animals, Plants and Their Environment

- a. K-LS1-1. Use observations to describe patterns of what plants and animals need to survive.
- b. K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
- c. K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

1. Heredity: Inheritance and Variation of Traits

- d. 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Research

Zoo visits serve as an experience for guests that is both educational and recreational in nature (Roe & McConney, 2015, p. 865). Zoos strive to create opportunities for guests to explore wildlife, engage with zoo staff and inevitably gain a better understanding of our place in this world and how we can do our part (Roe & McConney, 2015, p. 865). However, even with these opportunities for enrichment set into place, the zoo more often than not is simply a place for a fun experience. Studies have shown that zoo visitors do not cite “learning” as a factor for their visit to the zoo. Primarily, visitors’ intentions are recreational, specifically to see the animals. Furthermore, “many visitors leave the zoo with a sense of helplessness, unsure of what actions they could take to contribute to conservation” (Roe & McConney, 2014, p. 856). Much of this reasoning is derived from the idea that guests are not a. there to learn and b. not given adequate resources to have a fulfilling educational experience. A non-formal educational experience at a zoo that focuses on conservation and positive environmental practices must be meaningful to truly help individuals become passionate and evoke change (Bueddefeld & Van Winkle, 2018, p. 97).

As my research question states: *how can zoo educators help individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific education programming?* I believe that an ideal way to help create this connection between recreation and education is by creating a curriculum unit to be facilitated at the zoo. This unit will have lessons to be facilitated on zoo grounds, as well as opportunities for “post-zoo” learning, thereby giving guests the opportunity to gain

that “sureness” of how to contribute to conservation after their zoo visit is over. By designing a curriculum that is engaging, guests will be more motivated about learning and will have all the necessary resources to further their response to conservation at home. Additionally, creating post-zoo experiences give individuals in a family a sense of community and togetherness.

Curriculum Design Model

I will utilize Wiggins and McTighe’s Understanding by Design Framework for my curriculum. The UbD framework focuses on 3 aspects: identifying desired results, determining assessment evidence and planning learning experiences and instruction (Bowen, 2017). Identifying desired results will consist of the curriculum goal, that visitors will explore the connection between wildlife and the environment and leave the zoo with concrete knowledge and resources to help conservation efforts in the community. In determining assessment evidence, a post-visit questionnaires will be incorporated to gauge the effectiveness of the program itself, as well as the benefit of the post-zoo learning experiences. Planning learning experiences and instruction will follow the lesson plan template that appears in Appendix A.

Appendix A

Lesson Plan Template

Project overview	<i>A basic summary of the program. The project overview includes the subject and main focus of the program, in addition to a connection between program material and post-zoo experience.</i>
Audience	<i>The appropriate age/grade level for the program.</i>

Prior knowledge	<i>Information that is useful and relevant for the instructor prior to the program.</i>
Standards	<i>Connecticut Next Generation Science Standards (NGSS) applicable for program subject.</i>
Learning objectives	<i>Outcomes of the program. What will the learner walk away knowing? What connections can be made between the program subject (wildlife), conservation and the environment? All learning objectives are measurable.</i>
Materials and resources	<i>Details program materials and resources that will be facilitated throughout the program, as well as materials and resources necessary for post-zoo experience.</i>
Sequence	<i>Steps in which the program will be completed. The sequence includes an introduction to the subject (anticipatory set), the main program, and conclusion/post-zoo experience introduction. Additionally, the post-visit questionnaire is mentioned.</i>
Post-zoo experience	<i>Resources/materials regarding project/activity to be done at home, as well as connection between the program and post-zoo experience.</i>

These three stages incorporated together will form the core of my educational program. By creating a connection and smooth transition between program goals, self-assessment, and a learning plan, this animal education unit will be clear and concise as to its purpose and function in a zoo setting.

Setting and Participants

My audience for this unit will be a diverse group of visitors to Connecticut's Beardsley Zoo. Connecticut's Beardsley Zoo opened its doors in 1922. It is the only AZA-accredited zoo in the state and has maintained its accreditation since 1987. The zoo itself is home to 300 individual animals, representing nearly 100 animal species. In 2018, Beardsley Zoo welcomed more than 300,000 visitors and shared many educational

accomplishments. These milestones include 6.4 million people who were educated through the zoo's media education programming. Additionally, 133,975 people were educated through outreach programs in the community, as well as 62,000 guests who engaged in education programming by teen educators, and 7,034 guests who participated in the *Wild Adventure: Saving Animals from Extinction* show (J. Summers, personal communication, November 22, 2019). These staggering numbers really develop a sense of what a critical role education plays at Connecticut's Beardsley Zoo. Additionally, there are many individuals that make up the core of Connecticut's Beardsley Zoo. In 2018 there were 52 employees, 130 volunteers who donated almost 6,000 hours, and 70 interns representing 24 colleges who donated approximately 11,000 hours (J. Summers, personal communication, November 22, 2019).

Educational programs at the zoo are offered on-grounds in Dr. Beardsley's Research Center, the carousel Annex and the Learning Circle, as well as off-grounds programs at schools, college campuses, libraries, senior centers, scout programs, and assisted living/special needs programs ("Zoo Education Programs," 2019). These off-ground programs facilitate the ZooMobile, a transport vehicle which travels the state with zoo educators and animal ambassadors to spread Connecticut Beardsley Zoo's mission of conservation, education and environmental awareness. All school programs use the framework of Connecticut's Next Generation Science Standards (J. Summers, personal communication, November 22, 2019). The specific program guide that I have developed will be facilitated in the Research Center, an indoor classroom setting with a capacity of approximately 25 adults and children combined.

The zoo itself is part of Beardsley Park, which lies in the northern area of Bridgeport, Connecticut. Bridgeport has a population of approximately 144,000 individuals, with the populations of White, African American and Hispanic making up roughly the same percentage of the population. In 2017 the per capita income for Bridgeport, Connecticut residents was \$22,806, with 20% of persons being in poverty (“Bridgeport, Connecticut,” 2018).

The intended audience for this project will be adolescents in grades K-2. Additionally, adults are an essential component of this curriculum in that they will assist adolescents in the “post-zoo” experiences.

Assessment

Assessment of adolescent learning is vital to this unit, as it provides the validation that individuals are indeed developing a deeper connection to wildlife, conservation and the environment through these programs facilitated by zoo educators, as well as the post-zoo experiences. Traditionally, much of the assessment of learning in a zoo setting is based on observation. Roe and McConney (2015) stated:

Although it may be difficult to determine if visitors who simply glance at an animal as they walk past an enclosure are engaged in learning, it can be argued that visitors who stop with the purpose of observing how an animal looks, moves and acts in real life are essentially engaged in free choice learning. (p. 866)

With this idea in mind, zoo educators can assess adolescent learning during programs through observation and engagement of guests. However, to gain more valuable and

concrete assessment data a post-zoo questionnaires will be facilitated into the program, as shown in Appendix D. This questionnaire will allow zoo educators to gain a more concrete understanding of the prior knowledge of guests who attend programs, as well as what new learning these guests have taken away after the educational program and simultaneous participating in a post-zoo experience.

Conclusion

Learning off-grounds after a zoo experience is equally as important as the learning that is provided on-site. The goal of many zoos, including Connecticut's Beardsley Zoo, is to provide visitors with opportunities to act upon the messages of conservation that were facilitated throughout their visit (Bueddefeld & Van Winkle, 2018, p. 98). Unfortunately, post-visit research regarding visitor's knowledge is very limited and not often acquired. "Visitors are rarely provided with take-home materials or strategies for putting their new knowledge into practice (Bueddefeld & Van Winkle, 2018, p. 98). Additionally, often zoo visitors feel as though they are not being challenged enough in an informal learning environment, and that they are capable of learning more if the experience was more "stimulating and meaningful" (Bueddefeld & Van Winkle, 2018, p. 98). With this being said, I believe that the zoo curriculum I will develop that contains both on-site programs and post-zoo learning to adolescents in grades 3-5 and adults will be the appropriate mix to help individuals develop a deeper connection to wildlife, conservation and the environment.

Chapter 4 contains a cumulative summary of what I have learned throughout the project process. This chapter highlights the different elements that were essential in

compiling my project, as well as relevant literature. Additionally, chapter 4 addresses implications and limitations associated with my project, future research projects in the zoo education programming field, ways in which i can facilitate future projects, and how my project will be beneficial to zoo educators.

CHAPTER FOUR

Reflection/Conclusion

Introduction

Education goes hand in hand with environmental awareness. I believe that to truly understand the natural world, you have to be aware. This awareness and understanding subsequently leads to passion and empowerment, the idea that our actions are often times irreversible and we must make more positive choices for a more hopeful future. These aspects are brought about by education, the idea of learning about the good, as well as the bad. Zoo animal education is one aspect of environmental awareness that allows individuals to learn about and develop an appreciation for wildlife, understanding its place in the natural world as well as our ability to coexist and our duty to preserve.

This capstone project has brought about a sense of understanding for me, as well as my hope for others, how vital educators in a zoo setting are. My research question of *how can zoo educators contribute to helping individuals in a community develop a deeper connection to wildlife, conservation and the environment through specific education programming* poses an important inquiry that I hope my capstone project assists in answering. Through my own research and review of literature I have personally developed a greater understanding and connection to wildlife and the natural world.

This chapter highlights different elements of the process of creating my capstone project. Included in this chapter is a summary of what I have learned both personally and professionally. Another element that will be addressed is my literature review. This

includes professional works that were influential to my work. Implications and limitations associated with my project will be discussed, as well as further research projects in the zoo education programming field. I will discuss ways in which I can use the results and evaluation of my project in the future. Finally, I will discuss how this project is beneficial to zoo educators.

Learnings

Perhaps the greatest element I have learned and taken away from this capstone project experience quite honestly is how little professional literature there is regarding education in a zoo setting. I am not certain if this is because there is genuinely not a lot of research in the field in general, or perhaps not as much interest in the connection between animals and education. Either way, it was interesting to note that while over the past decade interest in environmental awareness has really skyrocketed, this does not negate as much to wildlife conservation in a zoo setting. I certainly think that in some ways there is a growing interest in helping wildlife. This can be seen in the reduction of plastic bags and drinking straws in many areas throughout the United States. However, in retrospect there is evidence that indicates that global warming is the main contributing factor to the increased warmth of the north and south pole, thereby making survival increasingly difficult for many native animals (“Arctic Climate Change,” 2019). However, even with this clearly obvious and compelling evidence stacked against us, it can be argued that there is not nearly enough education, awareness or concrete change.

Literature Review

There were many elements of my literature review that proved to be influential in guiding my capstone project and rationale for zoo animal education. One example of this influence would be the work of Ojalammi and Nygren (2018), who discussed the momentous change in zoos' missions, as well as the move zoos were making from a recreational experience, to one that is deeply rooted in education, wildlife conservation and environmental awareness. This ever increasing interest is the backbone to my rationale of the importance of zoo animal education programming.

Another article that was influential in the development of my capstone is the work of Fa, Funk and O'Connell (2011). The article "Zoo Conservation Biology" discusses and debates many controversial issues related to zoos themselves, as well as the exceptional role zoos play in conservation. The authors argue the importance of zoos in regard to "captive breeding, public education, and being ambassadors for wildlife" that zoos are at the forefront in contributing to (Fa, Funk & O'Connell, 2011, p. ix). Fa, Funk and O'Connell state the significance that zoos have in conservation, specifically in "well-managed living collections of wild animals, as well as educating and inspiring visitors through well-designed, self-sustaining animal exhibits (Fa, Funk & O'Connell, 2011, p. ix). The authors also comment on how far zoos have come in understanding their role in conservation and what the priorities are, as well as how zoos can function collaboratively as both educational and commercial establishments (Fa, Funk & O'Connell, 2011, p. xi). "Education in modern zoos must be more than showing the animal in a 'naturalistic' enclosure with accompanying signage detailing basic natural

history information” (Fa, Funk & O’Connell, 2011, p. 225). Informal educational programs in a zoo setting are a valuable way to deliver a quality learning experience that is both enjoyable and purposeful. “Developing appreciation of wild animals is an integral part of efforts by zoos to increase environmental awareness and to gain support for worldwide conservation” (Fa, Funk & O’Connell, 2011, p. 220).

Implications

One implication related to this capstone project involves assessment. While I believe the best means of assessment for this project involves a questionnaire to evaluate the effectiveness of post-zoo experiences, if this project were to be implemented into a different scenario, an alternate means of assessment may be best. For example, these programs can be facilitated for other individuals aside from zoo guests, such as school groups on a field trip. In this instance, a teacher may provide a formal or informal assessment after the program to evaluate learning. A formal assessment may involve turning the post-zoo experience into a school or at-home project. The teacher may give a test or a quiz back at school after the program to assess learning. An informal assessment may include observation of engagement and participation in the program activity.

Limitations

Perhaps the largest limitation of my capstone project would involve receiving and compiling assessment data. The purpose of post-zoo questionnaire is to allow zoo educators to gain a more concrete understanding of the prior knowledge of guests who attend programs, as well as what new learning these guests have taken away after the educational program and simultaneous participating in a post-zoo experience. However,

the constraint associated with this means of assessment involves the participation of guests. If guests are willing and able to participate in the post-zoo questionnaire, providing genuine input and suggestions regarding the programs, the assessment is certainly beneficial. Conversely, it can be argued that guests often are not interested in, or forget about these kinds of materials. In this case, the post-zoo questionnaire is not very helpful and hence little assessment can be collected on the effectiveness of these zoo education programs.

Future Recommendations

This capstone project opens the door to a wealth of ideas for future projects. Essentially any animal in a zoo or aquarium setting can fit into this program mold. While some animals may not be ambassador animals and can not be facilitated live during presentations, there is still ample opportunity to learn about and explore different species, and continue learning beyond the zoo with post-zoo experiences.

Based on my findings my best recommendation for future projects would be to continue facilitating these education programs in zoos. I believe they are both fun and educational and give children and adults of all ages a quality learning experience. Furthermore, the format for these programs can be facilitated in other settings aside from a zoo, such as nature centers, museums, or aquariums. These programs are versatile in that the instruction can be differentiated to meet diverse groups of learners including learners with special needs, students in urban settings, senior citizens and those in low income communities.

Additionally, research provided by Packer and Ballantyne (2010) indicates that guests who come to the zoo already with knowledge and interest regarding environmental awareness are more prone to take away information from the experience. This learning will continue to build and develop after each additional visit, if in fact the individual is motivated to learn (Packer & Ballantyne, 2010, p. 30). With this in mind, it can be argued that educational programs should continue to be at the core of the zoo experience. The more guests have an opportunity to develop knowledge and understanding about wildlife and the environment, the more motivated they will become about environmental issues and subsequently will want to take action.

Benefiting the Profession

This project is beneficial to the zoo profession. It allows zoo educators a format for conducting learning in a zoo setting. Furthermore, this format for education programs can be modified to accommodate education programs off zoo grounds. Many zoos across the United States facilitate outreach programs, or educational experiences that happen off zoo grounds in a variety of different organizations. For example, Connecticut's Beardsley Zoo offers a "Zoomobile" program in which zoo educators will travel to a school, library, senior living center, or scout group to provide an educational program off the zoo grounds. These outreach programs provide an exciting opportunity to learn in a familiar environment. Furthermore, through these programs, learners often become eager to visit their local zoo to further their recreational and educational experience ("Zoo Education Programs," 2019).

In the future I hope to communicate my results to other zoo educators. I believe that these program guides are beneficial to learning in a zoo setting, and they can serve as a guide or template for programs in any zoo facility. These program guides are flexible in that they can be altered and manipulated to fit virtually any animal. I will continue to expand on my capstone project and develop new curriculum and assessment for zoo educators as I learn and develop new information about the field. I hope to one day present these programs myself as a zoo program educator.

Conclusion

In summary, I found this capstone project to be a very meaningful and engaging experience to the zoo profession, as well as my career prospects. I hope to be able to facilitate this program material personally in the future as a zoo program educator. Additionally, I hope that other zoo educators can use this material, or become motivated to develop their own zoo program curriculum that incorporates the different elements of classroom learning, hands-on animal encounters, and post-zoo experiences.

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