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Description of a Species for International Education: Zoos Â Literature Review

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Description of a Species for International Education: Zoos
A Literature Review

A Master's Project by
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Acknowledgments:
I would like to thank my brother Will, my mother Kristin, my advisor Jacqi especially, as well as all of my friends and colleagues at CIE at Umass for their continued support for and belief in me to pursue this research path as well as this project even when I have had periods of strong self-doubt and feelings of discouragement. This project is representative and a culmination of what has at times felt like a tortured and difficult personal journey over the past nearly two years. I thank these individuals from the depths of my heart for pushing and supporting me to steadfastly pursue my passion and for believing in the value and worth of this endeavor. Thank you!
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Frequently Appearing Acronyms:
Although these are explained in the text as well, here is a list of some of the more frequently
used acronyms in this paper

AZA- Association of Zoos and Aquariums
BIAZA- British and Irish Association of Zoos and Aquariums
MFG- Madagascar Fauna Group
WAZA- World Association of Zoos and Aquariums
WZACS- World Zoo and Aquarium Conservation Strategy
ZSL- Zoological Society of London

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Description of a Species for International Education: Zoos
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Abstract
Zoos are an international phenomenon and are behaving strongly as complex multifaceted educational institutions. With hundreds of institutions around the world and hundreds of millions of annual visitors zoos, as a community, have a tremendous international and educational reach. However, despite these characteristics, zoos consistently remain off the radar of the comparative and international education field. The strongest reason for this, perhaps, is that literature, research and discussion about zoos, education and learning has largely remained confined to literature published by and for zoo professionals and within zoo industry journals. With regards to the international education field this is unfortunate and in light of the research contained within the zoo industry literature, this can be a critical issue especially when one considers that the majority of zoos and zoo visitors in around the world are not in the 'West'. This literature review, therefore brings literature on zoos and education out of its traditional confines and into the awareness of the international education field to answer a critical question: What is known about zoos and education and how can this be important to the international and comparative education field? The review of the literature finds striking answers to this query, with the zoo literature stating clear and broadly shared education aims but largely lacking in critical research on the success of zoos in meeting these goals. Furthermore, the little extant research suggests that zoos are failing in these aims as regards results, focuses almost entirely on the informal learning context, largely ignores research on children's learning and is fundamentally dominated by researchers and institutions located in the 'West' (read, the United States, Europe and Australia). In fact, literature on zoos and education offers more questions than it does answers. But, while apparently discouraging, this literature demonstrates a clear and present opportunity for the engagement of the international education field in opening up research in multiple under or un-researched areas as well as the opportunity for practitioners to engage with educational programs and opportunities already being offered by zoo institutions. The message is clear, zoos are important educational institutions in the world and they are tremendously compelling as a new species of interest for the international and comparative education field.

Prelude
In 2009 during the height of Israeli blockade and siege of Gaza, an interesting pair of creatures appeared at the Marah Zoo (Weinberger 2009). Dressed smartly in their blacks and whites they expertly drew the attention of those visiting the facility. Something, however, was off about these two animals. While they appeared to be zebras, on closer examination they were clearly revealed to be a pair of donkeys that had been appropriately painted as zebra.
understudies. The look was so complete as to fool almost all but the most attentive visitors, like medical school students.

This desperate ingenuity on the part of the zoos' managers was in response to the limitation of resources placed on the zoo by the blockade of the city as well as the demands of a public for whom, in spite of the conflict, the zoo provided a critical and popular place for entertainment and a semblance of peace amid the chaos. Similarly, in Kabul, Afghanistan (Perry 2009) and Baghdad, Iraq (Anthony & Spence 2009, Nickels 2009) residents of cities in fragile, high conflict areas consistently sought the zoo as a rare peaceful place to bring their children and relax as families. Despite the circumstances, zoos find themselves to be critically important to their communities around the world.

**Introduction**

**Problem Statement**

According to the World Association of Zoos and Aquariums, over 700 million people visit zoos and aquariums each year at 1,300 institutions around the world (WAZA.org 2012). The educational opportunities offered by these institutions aim to encourage awareness of ecological, conservation and sustainability issues in a public increasingly disconnected from wild environments. With a majority of zoos worldwide found outside of Europe and North America and the potential for these institutions to contribute to addressing multiple educational issues, there is place for zoos in international and comparative education studies and a place for comparative and international education in zoos.

However, the presence of zoos in international education literature and education
literature in general is minimal to non-existent. Instead, the majority of the literature on education and learning in zoos is present in journals and documents internal to the industry. Without a strong awareness of the conversations, issues and topics already being addressed by this literature it is difficult to know where insights from comparative and international education studies are of most use and what particular insights zoo education research can contribute, in turn, to comparative and international education studies. Therefore, a review of the existing literature on zoo education is critically important to closing these gaps and bringing zoos into consideration as an important sub-field of international education.

Methodology

The project discussed in this paper comes out of a rather personal and conflicted journey to make some peace with an ultimately imperfect situation. When I began the pursuit of a master's degree, for which the completion of this paper is a part, I was uncertain of where I wanted the degree to lead me specifically and what area of research I wanted to focus my attention on through the course of my studies. Before I started the program, I had spent some time contemplating career paths and where I would most likely be able to feel happy in work. In contemplating this, especially in light of previous work and positions I have held over the years, I continually found my thoughts drifting back to my experiences working at a summer day camp situated in the Roger Williams Park Zoo. That was the first volunteer position or job that I had ever held and it was also the context in which I fell in love with teaching. The opportunity to teach in that environment along with the chance to work with animals as well, led to easily the happiest and most contented working environment that I have ever experienced.
However, when I arrived at my degree program I found myself compelled by the atmosphere of student and department interests to abandon zoos as a research interest and instead oriented myself towards education in the context of former Soviet countries in transition. Education in this context was also an interest of mine and through much of my first year of the program I set the orientation of class research papers towards it. But, although, some of the research I pursued in this respect was interesting to me, I wrestled mightily with it and found it to feel ultimately unsatisfying. In order to remain in the master's program and remain remotely content I had to return to a path that would help lead me to returning to zoos as a career path.

The project within this paper evolved from that desire. In order to pursue zoos as a research topic in conjunction with pursuing the master's degree in international education, I had to find a way of tying zoos back to learning and education, and international education in particular. I knew from my experiences working at a zoo that zoos have educational programs and I also knew intuitively that other kinds of learning must also occur at zoos as families, children and individuals perused the exhibits of a zoo, however it was unclear how these pieces could tie back to international education.

In the spring of 2011, in connection with research on the effects of conflict on zoos I began some preliminary searches for the presence of zoos in international education literature and education literature in general. This research continued in fits and starts over the course of the summer of 2011 but picked up in earnest with the advent of the fall semester and research connected to a course on gender issues in science and science education. In connection with this course we were required to write a literature review on an area of personal interest regarding gender and science education. I naturally pursued gender issues in the context of zoos and

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learning therein. This thesis project emerged from a combination of those research efforts and the awareness of the field which they provided.

The clearest insight was that zoos were entirely absent from international education discussions and only a little more than non-existent in education literature generally. In the case of science education literature, zoos have a minor presence principally in literature on learning in museums. In this case, a very small number of sources exist that examine zoos alone. More often, however, zoos are lumped in together with museums or ignored entirely. From reviewing education literature it becomes apparent that little or no discussion or research on learning is present on zoos. Looking farther afield, however, one finds that indeed literature does exist on the subject, however it exists almost entirely in journals written for the zoo industry itself or in documents produced by industry organizations such as the World Association of Zoos and Aquariums, the Association of Zoos and Aquariums (an American outfit), the European Association of Zoos and Aquariums and the International Zoo Educators Association. The purpose of this project found its footing from this research. That purpose is two-fold, to present the research that is present within the zoo industry literature on learning and education in zoos for the purposes of understanding what exactly is known it and, to link that literature to the field of international education.

The heart of this project and paper is actually quite simple and straightforward, that is it attempts to provide a review of the literature that is present on learning in zoos. The overriding question guiding the review of this literature is simply; what does this literature say and know about learning in zoos?. To find this literature, I searched through databases including Google Scholar, the University of Massachusetts Amherst library catalog, as well as ERIC looking for
any literature in English that discussed education or learning and zoos. I also perused the World Association of Zoos and Aquariums website as well as the International Zoo Educators Association. I also sought literature that was cited in other pieces. While I do have proficiency in languages other than English, I limited my review of literature to pieces published in English primarily as a matter of expediency (I could review more pieces more quickly in English) as well as a matter of focus. It is important to recognize, however, that a feature of this industry and its international nature is the presence of multiple regional, national and sub-national zoo organizations which produce documents in other languages and for their own purposes. The focus on English literature is a recognizable limitation of this paper. The insights, threads and conclusions I draw from this literature might be refuted by information present in non-English literature. Although, it could be argued that sufficiently relevant literature would be published in English as well as a matter of course personal experience with the zoo industry suggests to me that this may not necessarily be the case and is, to me, a recognized limitation of the scope of my review and conclusions.

**Organization**

To fully accomplish the purpose of this paper, being to review the literature on learning in zoos as well as open this field to discussions in the international education field, it is organized around three principle sections. Two of these sections are focused on these topics while a preceding section prefaces the topic by discussing the importance of informal learning in relation to formal learning broadly.
**Informal Education: Why does it matter?**

What is the place for informal learning in international education, rather, what is the place for informal learning/education opportunities in the provision of education internationally? What role can informal learning settings such as zoos play in the world? More broadly, why should informal learning matter? In the following section I begin by examining the broad case for informal education and then take a look at the particular role for informal learning opportunities in the provision of science education.

Following this discussion, the section will then turn to a sense of definition for informal, formal and non-formal learning which is necessary for the more specific discussion of learning and education in zoos. This course is taken for two reasons; the least consistently defined or delineated aspect of the informal learning field is definition with respect to formal learning. Secondly, the delineation/definition of formal, informal and non-formal learning is more critical to discussions of learning and education in zoos, as a matter of specific differentiation between contexts, than it is to the broader discussion of the place for informal learning and formal science learning. In fact, wrestling with a discussion of definition could muddy the broader discussions of the field.

For the purposes of this general discussion on the potential contributions of 'the informal learning sector' to the project of education in general we will differentiate simply between formal and informal learning taking informal learning to mean the opposite of formal learning; that is informal learning is simply learning not in school. We will revisit the vagaries and complexities of this delineation later in defining distinctions between formal, informal and non-formal learning.

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The argument for the importance and contribution of informal learning to the broad project of education rests on the notion that informal learning can complement the formal learning sector by addressing subjects and providing contexts that it cannot. The informal learning sector can provide learning contexts and opportunities not possible in the formal sector as well as up-to-date content not readily available in the formal sector.

Formal sector learning is constrained by traditions of physical and temporal structure as well as management. These traditions are a dependence on a formalized bureaucracy which is subject to the whims and peculiarities of political constituents. Stocklmayer et al (2010) expand on these constraints as limits of time, structure, priorities, and inertia/bureaucracy. The formal learning sector, i.e., school systems, lack the time for teaching basic literacy and mathematical skills in addition to training young people in “higher level 21st century skills” (Stocklmayer et al 2010 p. 26). School systems are also constrained by their physical structure. The physical arrangement and size of classrooms places limits on the flexibility of the learning environment in particular on the ability to engage in small-group activities that are considered critical to developing the aforementioned “21st century learning skills”. The limits on school systems in terms of inertia and bureaucracy refer to entrenched conceptions of the nature of schooling and learning as well as the systems of management that limit the ability of school systems to change and adapt quickly to new learning needs. Furthermore, the inertia of bureaucracy and schooling prioritizes teaching and curricula to particular subjects that reduce the flexibility and time available to adapt new subject matter. Experienced educators might reasonably counter the notion that classroom structure discourages small group work. However, certainly the limits of time in school and the limitations of bureaucracy can be considered very real and valid.
limitations on the ability of the formal learning sector to adapt quickly to changing education needs. As Stocklmayer (2010) and her colleagues argue, the informal learning sector, by contrast, and due to “its diversity, is relatively immune to bureaucratic control and hence ossification [and]...has the great advantage of being able to offer a much quicker response to new discoveries” (p. 26-27).

More than this, informal learning can offer contexts for learning not available in formal schooling and contexts that may be more conducive to learning. In Stocklmayer et al. (2010) proponents and researchers of the contributions of informal learning note that

“learning rarely if ever occurs and develops from a single experience...learning in general...is cumulative, emerging over time through myriad human experiences, including but not limited to experiences in museums and schools...The experiences children and adults have in...various situations dynamically interact to influence the ways individuals construct...knowledge, attitudes, behaviors, and understanding...in this view is an organic, dynamic, never-ending, and holistic phenomenon of constructing personal meaning...This broad view of learning recognizes that much of what people come to know about the world...derives from real-world experiences with a diversity of appropriate physical and social contexts,...” (Dierking, Falk, Rennie, Anderson, & Ellenbogen 2003 p. 109 in Stocklmayer et al 2010, p. 8).

Learning is a personal, contextualized process that requires time (Stocklmayer et al 2010) a process that formal learning environments consistently struggle to support fully. As a result, trying to understand student's motivation and interest in learning is a consistent feature of educational research related to the formal sector. Multiple educational researchers (Ryan & Deci 2000, Schiefele 2009, Renninger 2011 for example) have tackled student motivation and interest in order to understand it and devise methods for improving student's interest and motivation to learn and study material required by schooling. Particular effort invested by this research often revolves around notions of extrinsic and intrinsic motivations to learn with the notion that
moving students towards intrinsic motivations and individual interests for subject matter will enhance their learning experiences, retention of material and, in turn, achievement.

In this literature, interest tends to be relational to an object (Schiefele 2009) which may be physical (such as a painting) or non-physical (such as an activity or subject area). Interest varies in duration and relative to contextual factors, both internal and external. Motivation is in turn the mental state of wanting to engage in an action such as learning (Schiefele 2009). With regards to formal sector learning, Renninger (2011, p. 3) notes that motivation in this field often refers specifically to “the energy behind conscious decisions to achieve in school”. These decisions refer to setting goals, self-regulation and determining the amount of effort to invest in accomplishing a learning task. Influencing these decisions are students' perceptions of their ability to succeed, or self-efficacy (Renninger 2011, p. 3). Expectancy-value theories of motivation refer to specific components of this process, suggesting that motivation consists of a series of expectancy values (Wigfield et al. 2009). Expectancy values are measures by which an individual assesses a task. This assessment influences the decision of whether to engage in a task as well as the degree of energy investment to engage in the task as well. An expectancy value of attainment and importance refers to a learner's assessment of a task's relation to their self-concept. In other words, this is the extent to which success at the task is important to maintaining or building a learner's self-image. Intrinsic value refers to an assessment of the likely enjoyment from engaging in a task. It is the extent to which performance of the task, in and of itself, elicits positive feelings. Utility expectancy value refers to an assessment of task performance as a practical means to achieve other ends, such as taking a required course in the pursuit of a degree leading to a desired career. The last expectancy value, cost, refers to the
assessment of what the learner has to 'give', usually in terms of energy or effort, to complete a task (Schiefele 2009, Wigfield et al 2009).

Continued long-term learning and engagement in a chosen subject matter is ultimately the goal of the formal learning sector as well as any goal-oriented actors in the informal learning sector, such as zoos or museums. A fairly broad consensus from the interest and motivation research literature is that this kind of long-term learning is best sustained by intrinsic motivations to learn which in turn stem from individual interests. Individual interest refers to interest that is internalized (Wigfield et al 2009). Intrinsic motivation and individual interest are inherently linked as the individual interest drives motivation to learn from within the learner (Schiefele 2009). An intrinsically motivated learner engages in learning automatically for its own sake.

The means to increase attention to and engagement in required subject-matter in schooling is, therefore, to develop student’s individual interest in that subject-matter which, in turn, should drive an intrinsic motivation to learn the material. This contrasts with extrinsic motivations to learn which are often considered inferior and more variable in successfully engaging students to learn.

With this research in mind, then, the next step for formal sector practitioners is to determine what kinds of strategies in terms of teacher actions, curricula, or materials stand the best chance of leading students to develop individual interests in the subject matter required by schooling. However, doing this is, in practice, quite difficult (Hofstein & Rosenfeld 1996). Leading students to develop individual interest in school subject matter is understood to be assisted by developing new interests that are connected to pre-existing individual interests. The development of individual interest and intrinsic motivation in classroom-required material is
connected to student's perceptions of their ability to succeed in the subject-matter.

Unfortunately, in practice, connecting to all students' possible interests and thereby making material equally meaningful to all students is not possible.

The strictures and requirements of the formal learning sector in terms of curriculum, structure and time is inherently not conducive to maximizing this kind of learning for all students. Inevitably some students, if not many, cannot receive the necessary time needed or the necessary contextualization and connections to make learning of school subjects fully personal for each student. Combined with the obsession for learner assessment and the measurement of achievement by grades, these constraints of the formal learning sector require some degree of extrinsic motivation for learning that is necessarily driven by an instructor.

While the structural requirements of formal learning require some degree of teacher-led learning and extrinsic motivation, the informal learning sector is inherently conducive to greater learner-led and intrinsically motivated learning (Stocklmayer et al 2010). In contrast to the more rigid structures of formal learning environments, informal learning environments such as zoos and museums provide contexts in which learning tends to be fluidic and sporadic, can be experienced episodically and is navigated freely (Stocklmayer et al 2010). In conjunction with the intent with which these settings are designed explicitly with a wide range of interests and audience configurations in mind, the nature of informal learning and informal learning environments allows learning to be lead directly by the choices of the participants. The exploratory free-choice nature of informal learning enables participants' to construct their own meanings and understandings from their experiences (Renninger 2011, Falk et al 2007). The free-choice nature of the experience extends to what an individual chooses to attend to or focus
on, as suits their interests and motivations, as well as to how much time to spend on the subject of their interest, whether it be an exhibit, activity, presentation or so forth. And as the nature of the informal learning environment allows for a learner's intrinsic motivations to fully guide their actions and choices, the learner has the opportunity to more fully experience affective components of learning such as excitement and enjoyment which contribute to the construction and retention of new knowledge than may be possible in formal environments. Finally, informal learning environments, by their very nature, also allow for social interaction and conversation between participants which also contributes strongly to the enjoyment and excitement of learning as well as the construction of knowledge (Bell et al 2009, Renninger 2011).

Beyond this, perhaps the most compelling reason for considering informal learning invaluable to education is that ultimately over the course of a lifetime very little of that time is actually spent in a formal education. By different reckonings as little as 3 to 9% of their lifetimes in school environments (Falk and Dierking 2002 as cited in Ballantyne and Packer 2011 p. 202, and Jackson 1968 and Sosniak 2001 as cited in Bell et al 2009). With this in mind the informal learning sector can have a huge role in supporting and facilitating learning for children and young people during their time spent outside of school. Beyond this, this means that the informal learning sector has a critical role in supporting life-long learning for all individuals as well as a critical role in providing up to date information especially in knowledge areas prone to rapid and frequent change such as the sciences.

The virtues of the informal learning sector allow it to address learning in areas that formal learning, as a result of its own nature, cannot address in the same way. In the effective provision of science education, this is especially the case. For a subject matter that is complex, practiced in
an intimately social context, and subject to frequent changes and updates, formal learning sector cannot provide science learning in the same way that informal learning environments can. The lack of dexterity available to the formal sector to provide the most up to date science curricula is supplemented by the informal sector’s precise ability to do so (see Hofstein & Rosenfeld 1996, Rennie & McClafferty 1995, and Stocklmayer et al 2010). Additionally, the constraints on time available for teaching science, balanced against competing subjects, hamper the ability of schooling to provide the time to fully explore science subjects as well as engage in science activities reflective of its practice by professionals. In the case of venues like science museums, interactive science centers, aquariums and museums, the informal sector provides the opportunity to engage with practicing scientists at the cutting edge of their field and in a context that allows the learner to explore the subject in with greater flexibility in time than can be afforded by formal environments. In order to fully appreciate the very human and very social nature of science practice to develop full scientific literacy, this kind of time and first-hand experience is critical for learners.

And as the informal science sector offers opportunities to mitigate the deficiencies of the formal sector in providing fully personal, contextual and related science learning experiences, likewise zoos offer particular opportunities to address particular gaps in wildlife and ecological knowledge and understanding as well as the now critically important areas of conservation and sustainability.

**Distinguishing Informal and Non-Formal Learning in Zoos**

Literature and researchers attempt to define and distinguish between formal, informal
learning, and non-formal learning. But, depending on the sources, distinctions between non-
formal and informal learning can easily be applicable to the other; and in distinguishing formal
from informal learning the point is quite clear in the literature that attempting to describe features
of each describes features that may also be found in the other as well. In this literature, informal
learning bleeds into the territory of non-formal learning as defined by other literature. In fact the
terms informal and non-formal learning in this literature are often used interchangeably for each
other and to mean the same thing (see for example Ramey-Gassert et al 1994, Leong et al 2010,

For the sake of reviewing the research literature on zoo learning and education it’s
necessary to distinguish between informal learning opportunities and non-formal learning
activities. This is both important for the clarity and ease of discussing this literature and because
these distinctions refer to different kinds of learning activities in zoos that should be considered
as different kinds of learning contexts. For these purposes, informal education or learning is
understood to be the learning that happens in the context of visitors perusing the zoos' exhibits.
Non-formal learning can be considered occurring in the context of programmatic activities
including day or overnight camp programs, outreach presentations to schools, trainings and so
forth.

**Learning and Education in Zoos**

As we will explore in the following section, zoos, generally speaking, know very well the
kinds of things they would like people to learn, specific learning goals, and how they would like
and expect people to learn these goals. There is plenty of discussion in the literature about these
goals and about the potential of zoos to meet these learning goals. However, literature on research in zoos begs the question whether zoos are actually achieving these learning goals and, if they are, to what extent. With regards to this understanding, the literature on learning in zoos displays a clear and specific bias towards research subjects and groups, namely adults, and learning context, namely the informal learning context. Notably absent from this discussion are the non-formal learning opportunities and activities that many zoos are engaged in.

**Goals and Aims: What do zoos want people to learn?**

In examining literature surrounding learning and education in zoos, the first substantive question that can be addressed regards the learning goals and aims of zoos. What exactly do zoos want people to learn either from visiting exhibits and/or engaging in educational programs?

As part of addressing aims outlined by Agenda 21 of the United Nations Conference on Environment and Development in 1992 in Rio Janeiro, the World Association of Zoos and Aquariums (WAZA) developed a comprehensive conservation strategy, *Building a Future for Wildlife*, in 2005. This document is also known as the World Zoo and Aquarium Conservation Strategy (WZACS). Agenda 21 refers to a “comprehensive plan of action to be taken globally, nationally and locally by organizations of the UN System, Governments, and Major Groups in every area in which human impacts on the environment” both Chapter 36 of this Agenda and the WAZA conservation strategy view “education, public awareness, and training” as critical components to addressing the aims of the UN conference (WZACS 2005, p. 35). With specific respect to the institutions umbrella-ed under WAZA, *Building a Future for Wildlife* sees the central educational role of zoos as “to interpret living collections to attract inspire and enable
people from all walks of life to act positively for conservation” (WZACS 2005, p. 35). With the 1300 WAZA-associated institutions extant around the world, Building a Future for Wildlife can be seen as fairly representative of shared learning aims and educational goals across the industry.

The WAZA strategy outlines specific educational aims for its member institutions as follows. Zoo learning should lead to excitement, enthusiasm, and interest in visitors about the natural world in general. It should lead to better understanding of the roles of individuals in conservation issues as well as understanding of conservation issues in general. By developing visitors' understanding of conservation issues and their roles, zoo education should lead to action and public support for addressing conservation problems at multiple levels and in multiple ways. Zoo education should provide a range of learning resources, materials and experiences for a diverse range of learners (ie visitors) that will allow them to be able to make better choices in their lives to benefit wildlife and the environment. Overall, learning at the zoo should lead learners to develop a sense of understanding of the relevance of conservation to everyday life as well as a greater awareness of the place of humanity in the natural world (WZACS 2005).

While the conservation strategy of the WAZA theoretically outlines the shared learning aims for most zoos and aquariums around the world other literature around zoos and learning can illustrate the extent to which this vision is shared, altered or added to. Research literature addresses this topic in the definition of research goals regarding the impact and effectiveness of learning at the zoo. Similarly other literature that may be more discursive or reporting of activities and subjects on zoo learning, indicate varying conceptions of the goal of zoo learning in their choice of language and focus as well.

In what is known as the Multi-Instutional Research Project, researchers from twelve zoos
and aquariums accredited by the Association of Zoos and Aquariums, a regional association for institutions primarily located in the United States, sought to examine the extent to which zoos are meeting their learning aims with respect to adult visitors. In outlining this research project in the document Why Zoos and Aquariums Matter, this project sought to answer two questions; “how do zoos and aquariums inspire visitors to care about the natural world and take meaningful conservation action?” and “what are changes in conservation knowledge, understanding and attitudes of adults who visit a zoo or aquarium?” (Falk et al 2007 p. 5). While these research goals share features with the WZACS (Building a Future for Wildlife, referred to earlier) document in describing a desire to raise knowledge and awareness levels, the MIRP project includes affective educational aims as well, that is, an aim for increasing emotional connections between people and the natural world and an aim of attitudinal change for adult visitors in relation to conservation issues. Although the WZACS strategy suggests that attitudinal shifts are implied by a goal of increased public support and action for conservation issues, the focus of learning aims is significantly more cognitive in contrast to the aims of Why Zoos and Aquariums Matter which clearly aim for specific cultural shifts in emotions.

Fraser and Sickler (2009) echo the MIRP researchers’ sentiments in “Measuring the cultural impact of zoos and aquariums” where they are asked to address whether zoos and aquariums are successful in communicating “issues of sustainability to [the] visiting public” (p.105). Fraser and Sickler proposed to change assessing this issue by instead asking how the public around zoos perceive the role of zoos in relation to conservation and sustainability issues. In addition, they ask how the activities of zoos relate to the perceptions, values and uses of zoos for conservation outcomes as conceived by various members of the public. For Fraser and
Sickler (2009), beyond communicating knowledge of sustainability issues, zoos should be involved in driving a shift in cultural attitudes towards these issues as well.

In research efforts similar to those of the AZA’s research study, researchers at the Zoo Measures Working Group of the British and Irish Association of Zoos and Aquariums (Balmford et al 2007) engaged in their own efforts to understand the impacts of a visit to the zoo on adult visitors. In looking at visitors to six zoos in the United Kingdom, Balmford et al wanted to measure the effects of a zoo visit on conservation knowledge, concern for conservation issues, and visitors' awareness of practical actions they can take to personally affect conservation. While the results of this study differ from those of the MIRP research study, the conception of learning aims for zoo education shows similarities both with that study and with the WZACS to some extent as well. By this study's conception, learning at the zoo should lead to increased knowledge of conservation issues, an increase in positive attitudes towards addressing conservation issues and concrete changes in actions and lifestyle.

Finally, Ballantyne and Packer (2011) conducting research in Australia strengthen the cause for the educational role of zoos in affecting behavioral change in visitors. Looking widely at various kinds of 'free-choice learning' opportunities available in tourism, Ballantyne and Packer look at the importance of learning resources that engage participants in continuing their learning and experiences beyond that from their visit. In particular, these researchers are concerned with the ability of zoos to encourage long-term environmentally sustainable behavior among those who come to the zoo.

**Contexts: Where and how do people learn at the zoo?**

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Now that we have a sense of what it is that zoos want people to learn from their interactions through visits and programs, the next question to ask is, how exactly do zoos intend to achieve these learning aims? Rather, from what do zoos intend learning to come from. As alluded to earlier in differentiating informal and non-formal learning programs, zoos intend learning to happen primarily from these two contexts.

The informal learning context refers to learning that happens from visiting the zoo, walking through it's environs and primarily learning from perusing and interacting with the zoo's exhibits. This context can also include regularly scheduled presentations conducted by zoo staff and volunteers. These presentations differ from other kinds of programmatic educational activities conducted by zoos because they are likely to be attended to in a significantly more ad hoc fashion than activities that are planned and registered for ahead of time. As we'll see, this informal learning context seems to be the primary context from which zoos expect learning to occur. This is logical in many respects since this is the learning context with which the largest number of people are engaged with learning at the zoo.

The second context from which zoos expect learning to occur would be the 'non-formal learning' context. This context includes programmatic educational activities that zoos engage in which are frequently inside the institution's environs but may also occur outside of it in outreach programs or traveling activities. These can include day camps, overnights, traveling camps, workshops, school visits and community programs. Most of these programs are typically targeted towards and intended for children. However, zoos can also offer programs for adult community members. An excellent example of this kind of outreach is performed by the Madagascar Fauna Group which manages the Parc Ivoloina Zoo in Toamasina, Madagascar.

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This group has established sustainable agriculture workshops and trainings for local farmers in addition to “Saturday Schools” for local children to supplement formal education needs as well as institute a culture, awareness and practice of sustainability in the community (Freeman 2009). In addition, zoos have partnered with schools and universities to provide academic and research programs for students.

Knowledge: What is actually known about zoo learning?

Knowing where zoos expect learning to come from, the next reasonable question revolves around what is actually known about learning at the zoo and the extent to which learning at the zoo actually meets the goals hoped for by the zoo community. While this area is one of critical importance, it is made difficult by the surprising dearth of research in three facets regarding zoo learning. The first of these is a lack of research on learning outcomes in zoos generally. Of the little research that is in existence, the, primary focus of this research is on investigating learning outcomes of adult visitors to the zoo and is on the impact of the informal context on learning. That is, the primary question this research literature seeks to answer is: do adults learn from a visit to the zoo? In contrast, little research is extant looking at non-formal learning context outcomes and, surprisingly, also very little research exists that is concerned with the impact of a zoo visit on the learning of children. As we examine the few studies that do exist, the lack of research in both of these areas should become apparent.

Learning impact studies of a visit to the zoo: for adults

The biggest piece of research on the subject of examining zoo visits and their impact on
learning was produced by the Association of Zoos and Aquarium's Multi-Institutional Research Project introduced in the previous section. As reported before, the goal of this research project was to measure the effectiveness of zoos and aquariums in raising conservation knowledge and producing positive attitudes towards conservation issues and action. The entirety of this Research Project consisted of two phases, a literature review of existing research on the impact of zoo visits, and a three-year study at AZA institutions examining the impact of visits on adults at multiple institutions (Dierking et al. 2002, Falk et al. 2007).

The AZA’s literature review, Visitor Learning in Zoos and Aquariums, categorized literature in the field by three focuses. These included research literature that was focused on assessing the prior knowledge, attitudes, affects and behaviors held by zoo and aquarium visitors as well as those held by the general public who might not visit zoos or aquariums at all. The second category of literature focused on literature concerned with the impact of visits to zoos and aquariums or to specific exhibits. The final category of literature was focused on material that presented information and methodologies that would be useful in developing the MIRP’s own visitor impact study (Dierking et al. 2002). Literature in this final category included both studies conducted in zoos and aquariums as well as research that was not but is still of relevant interest for developing the MIRP’s own study approach.

While literature on the pre-existing knowledge, attitudes and awareness of visitors to the zoo is interesting, for the immediate purpose of understanding education and learning in the zoo context, the important results here come from the review of literature on learning impacts. The authors of this review note that “studies of visitors' entering knowledge and attitudes toward animals and conservation issues, studies investigating the impact of a zoo or aquarium visit on
visitors is relatively uncommon” (Dierking et al 2002, p. 7). Doubly problematic as far as these studies are concerned, most of them focused on changes relative to a specific exhibit and often with regards to only one or two variables. Rarely did any of the studies available in the literature examine changes in knowledge, affect, attitudes and behavior together in the same instance.

Dierking et al drew a number of conclusions from their broad review of literature. Firstly, although the zoo and aquarium industry has often been concerned with and spoken of the educational impact on individuals' conservation knowledge and attitudes, very little research has actually been conducted to examine this impact. The little research that does exist is really only focused on very specific impacts in the context of evaluative studies around particular exhibitions, “with little to no systematic research regarding the impact of visits to individual zoos and aquariums on visitors' conservation knowledge, awareness, affect or behavior” (Dierking et al 2002, p. 19). The specificity and evaluative nature of most of these studies prevented their results from being reasonably generalizable to other exhibit contexts or to the overall impact of a visit to any particular zoo or zoos broadly. The literature reviewers for this project do write in their conclusions that despite this paucity in research, that they do feel the little research that was in existence allowed them to say that zoos and aquariums are able to communicate conservation messages although these messages may be “subtle, short-term and generally difficult to attribute to specific experiences or even specific institutions” (Dierking et al 2002, p. 19). They felt that the greatest information provided by the extant research at the time was relative to changes in visitors' levels of knowledge and conservation behavior but very little on the impact of a visit to a zoo or aquarium on beliefs and values around animals or conservation. This observation from the literature is quite interesting in contrast to the MIRP's data from its own study. However, this
literature review does very well to illuminate the “significant gap [that] currently exists between what zoo and aquarium professionals believe zoos and aquariums are designed to accomplish and what the public thinks they are for” (Dierking et al 2002, p. 19). This sentiment is strongly supported by Fraser and Sickler's (2009) own research on the cultural impact of zoos in which they demonstrate very clear distinctions in attitudes, perceptions and understanding of the role of zoos between the general public and individuals intimately involved in the zoo industry, such as employees and volunteers.

Following the literature review conducted by Dierking et al, the MIRP engaged in their own comprehensive study of the impact of visits to a zoo or aquarium on the knowledge, attitudes, behaviors and awareness of adult visitors. The MIRP study itself consisted of two phases. The first phase was designed to confirm the applicability of an identity-related framework for categorizing visitors to the zoo by their motivations, prior knowledge, and attitudes. The second phase was designed specifically to capture the effect of a visit to the zoo on adults' knowledge and attitudes regarding conservation. The majority of the 12 institutions involved in the MIRP study were involved in the first phase of this project while four remaining institutions selected to broadly represent the zoo and aquarium community were part of the second phase.

In the first phase, the MIRP researchers sought to confirm the applicability of an identity-related motivation framework developed by John Falk (2007) and other researchers to categorize visitors to museums. This framework had been developed in response to the lack of predictability that standard visitor demographics afford in predicting pre-visit knowledge and attitudes and consequent changes as result of a visit. Falk et al (2007) predicted that zoo visitors would
generally fall among one of five identity-related motivation categories: explorers, facilitators, professionals/hobbyists, experience seekers and spiritual pilgrims. Explorers are visitors who come to the zoo driven by their curiosity. They come to the zoo and engage in a desire to learn more about whatever they find in the zoo. Facilitators are visitors who are focused on the visit as an opportunity to support the experiences and learning of those they accompany in a social group. Professionals and hobbyist visitors are driven to the zoo by feelings of close connection to the zoo’s content and mission by virtue of professional or hobby interests. These visitors see visits to the zoo as an opportunity to extend knowledge, interest or training that they already possess as a result of their profession or hobby. Experience seekers attend a zoo for the simple satisfaction of visiting the site. Falk et al (2007) describe experience seekers as individuals typically visiting from out-of-town who simply desire to visit the zoo because this is a typical activity for an out-of-towner to do. The final category of identity-related motivations describes 'spiritual pilgrims' who visit a zoo for personal reflection. Spiritual pilgrims visit to, perhaps, escape the noise of an urban environment or simply to “enjoy the peacefulness of the setting” (Falk et al 2007, p.15). For spiritual pilgrims, the trip to the zoo is a potentially restorative experience. The results of this phase suggested to the researchers “that it was indeed possible to segment visitors using [entering identity-related motivations]” showing that “half of visitors (48%) began their zoo or aquarium visit with dominant identity-related motivation; the rest possessed multiple motivations for visiting” (Falk et al 2007 p. 10).

The second phase of the MIRP study consisted of the three-year study proper investigating the impact of a visit on adults. In addition to questionnaires at the zoo, this phase of the study included post-visit surveys over the phone between seven and eleven months after
their visit. The sample population for this phase of the study was composed of 1862 visitors, from which the MIRP researchers concluded a number of results. Their study showed that 61% of visitors found their experiences at the zoo or aquarium to reinforce their values and attitudes about conservation. For 54% of visitors, their visit to the zoo led individuals to reconsider their roles in conservation and to see themselves as a part of the solution. For 57% the visit to the zoo strengthened visitors' connections to nature and 42% believed zoos and aquariums play an important role in animal care and conservation education. Finally, of the visitors who were surveyed months after their visit, 61% of them could discuss what they had learned from their visit and 35% of them mentioned that the visit had reinforced their attitudes and beliefs towards conservation as well as their love of animals and related values (Falk et al 2007 p. 4, 9-10).

From these results and others, the MIRP researchers claimed that “the visitor impact study found that a visit to an accredited zoo or aquarium in North America has a measurable impact on the conservation attitudes and understanding of adult visitors” (Falk et al 2007, p. 9).

The results of the MIRP’s study, however, are problematic. On the one hand, the efficacy of the identity-related motivation approach to the study raises questions as to the extent to which it artificially boxes visitors into particular motivation categories and the extent to which these are reasonable. Particularly this is the case when the researchers find that less than half of the visitors they looked at could be categorized into a single identity-related motivation category while the majority of visitors came to the zoo with multiple identity-related motivations. With regards to actual learning, the researchers' own study did not find any statistically significant changes in overall conservation knowledge as a result of their visit (Falk et al 2007, p. 10). The study's research suggests that this is the case because visitors to zoos and aquariums in the
United States already arrive at their visit with high levels of conservation knowledge and awareness. These were levels of knowledge and awareness much higher than the researchers had expected of visitors. Beyond these issues, there is a tendency within the AZA report to use language that seems to overstate the strength of their results and that would support a positive interpretation of the ability and effectiveness of zoos to meet their learning aims as well as the applicability of the study’s results. As in describing the results of their study of the applicability of identity-related motivations in describing zoo visitors, the researchers frequently refer to percentages below 50% with language such as “half” or a “majority”. Beyond this, while only zoos and aquariums located in the United States participated in the MIRP study, the researchers insist on referring to their results as applicable for institutions and visitors in the whole of North America.

The inconsistencies between reporting and results in this study make it difficult to share the conclusions of the MIRP study. It seems from the MIRP's study that the effectiveness of zoos, certainly American zoos, is minimal as far as the learning of adult visitors is concerned. The study's results show that if adults learn from a visit to the zoo, learning is minimal at best. While we can't conclude broadly for all zoos that visits are ineffectual in meeting learning goals, the separate study conducted by the British and Irish Association of Zoos can help broaden our conclusions somewhat.

The study conducted by Balmford et al (2007) at six UK zoos also focused on the effectiveness of informal education, a visit to the zoo, on educating adult visitors. The researchers’ study “focused on measuring various aspects of visitors’ knowledge about conservation, their level of concern about conservation relative to other issues and their ability to...
suggest practical ways in which they could make a difference to conservation” and was intended to quantify the effects of a visit to the zoo (Balmford et al 2007, p.121). Using comparisons of surveys conducted on entering and exiting visitors the study used questionnaires that solicited answers regarding respondents' background information, conservation knowledge, concern about conservation and their ability to suggest or name useful conservation activities.

From the answers to these surveys, the investigators looked at five response variables with respect to a zoo visit. These variables were identified as conservation knowledge, hypothetical spending on conservation, hypothetical spending on habitat, hypothetical spending on international conservation, and the ability of respondents to name useful conservation activities. Conservation knowledge was determined by answers to questions which were then ranked for correctness on a scale of 20. Respondents were first asked to name a globally threatened species as well as a threatened species in Britain and then to give a reason for why these species are threatened. In grading correct responses, the researchers chose not to treat 'species' scientifically and instead treated it loosely accepting responses like whale or bat as correct responses (Balmford et al 2007). Next, visitors were asked to rank conservation issues including pollution, over-hunting/over-harvesting, habitat loss, introduced species, and climate change based on their threat level to local, British species, as well as global species. Lastly, the questionnaire asked visitors to rank order ice caps, tropical forests and freshwater habitats by the relative global threat they face. On average, visitors to the six UK zoos involved in this study seem to have come to the zoo with rather low levels of conservation knowledge as understood by the researchers. The visitors’ mean conservation knowledge score was 9.26 (+/- 0.23) out of 20 (Balmford et al 2007, p. 124). While the researchers do not discuss their expectations in regards
to visitors’ conservation knowledge, this result suggests, perhaps, that average visitors to zoos in the United Kingdom may not have as high a level of content knowledge as visitors to zoos in the United States that was reported by the MIRP. This conclusion is limited since the researchers from each study measured conservation knowledge differently. In fact, the MIRP study provides too little information to create enough of a picture of their conception of conservation knowledge to even loosely compare it to the piece from Balmford et al. At the very least, even these apparent differences in pre-visit knowledge of UK and US zoo visitors suggest the importance of the socio-cultural context of a zoo and the limitations of trying to define a typical zoo audience or visitor for the purpose of measuring learning.

With regards to hypothetical spending variables, these came from the researchers’ attempt to measure the level of concern that adult zoo-goers have for conservation issues. To capture relative levels of concern, the researchers presented respondents with three hypothetical scenarios in which they were asked to allocate 1000 pounds to different charitable organizations. The first scenario asked visitors to distribute this money between charitable causes including domestic social concerns, animal welfare, international aid, health and conservation. By this hypothetical, the researchers could capture the concern for conservation relative to other societal concerns. In the second scenario they were asked to distribute donations solely among conservation organizations. With this scenario, the researchers hoped to capture a comparison of concern for international as compared to local conservation issues. The final hypothetical scenario hoped to capture relative concern for habitat-based conservation as compared to species-based conservation projects by again asking respondents to distribute 1000 pounds solely to conservation charities (Balmford et al 2007).
The results of this study in the United Kingdom are striking in comparison to the MIRP's results in the United States. The Working Group of the British and Irish Association of Zoos and Aquariums study found *no* significant difference at any site between arriving and departing conservation knowledge scores, spending on conservation, habitats or international conservation spending. The only significant difference that the researchers found was in the ability of visitors to name effective conservation activities that people could engage in. This effect was only found at one of the study's sites and the researchers felt that this was most likely an “artifact of [the] visitors apparently being in a greater hurry to complete the questionnaires on entry than on exit” (Balmford et al. 2007, p. 128). Reinforcing the notion that a visit to the zoo has little or no impact on adult visitors, the researchers found “very little evidence...of any measurable effect of a single informal visit on adults' conservation knowledge, concern or ability to do something useful...[and] formal power analysis suggests that the overall effects of a single visit, pooled across zoos, must be slight or non-existent to have gone undetected given our sample size and analytical framework” (Balmford et al. 2007, p. 133). The conclusions from this study are further reinforced by their report of results from other earlier studies that also suggest learning from zoo visits is minimal at best.

“Kellert and Dunlap (1989), comparing arriving and departing visitors at three US zoos, found that a visit...if anything, led to a general decrease in wildlife knowledge Working at Jersey Zoo, Broad (1996) found departing visitors knew better than arriving visitors which of the species exhibited were threatened, but in follow-up phone calls 7-15 months later, 80% reported that the visit had not influenced them in any way." p. 133

The latter report by Broad further complicates the MIRP's own results which suggested that visitors do show the impact of their visit months later. It is important at this point to also note that each of these studies, including the Balmford et al and MIRP pieces, are focused on the
effects of a single visit on visitors' learning. Balmford et al's discussion points out that perhaps “informal education does have effects, but that these either take time or repeated visits to manifest themselves...however, measuring long-term effects of individual visits is difficult...moreover, the few studies to have conducted follow-up interviews have found the immediate effects of a zoo visit generally wane over time” (2007, p. 133-134). This is interesting in light of some of the results within the Balmford et al study which in fact do suggest that there may be an important effect of repeat or multiple visits to zoos. The study found positive correlations between prior visits to a zoo with higher conservation knowledge scores, higher spending on international conservation charities, and a greater ability to suggest useful conservation actions. However, the authors suggest that this may not necessarily be an effect of the zoo visits themselves rather than reflecting individuals' general interest in wildlife (Balmford et al 2007). The notion that repeat visits to zoos are important to learning at the zoo is something that is addressed in another study that will be addressed shortly and one that differs importantly in other ways from this study and the MIRP study. In addition to the focus of these studies on the impacts of a single visit on learning it's critical to note that these studies focus on the learning of adults at the zoo and not children.

From these wide-reaching studies by the AZA and BIAZA conducted across multiple institutions in the United Kingdom and the United States we get the distinct impression that zoos face the distinct possibility that they are failing to meet their learning aims. It does not appear that adult visitors to the zoo are experiencing the significant changes in knowledge and attitudes that the zoo community envisions their institutions to be accomplishing. At most it seems that the learning that adults receive from their visits to the zoo is negligible and at worst it seems that
the zoo's informal context is failing to provide any educational experience whatsoever. Why is this? There are many possible explanations. Perhaps the researchers who are investigating zoo learning are orienting themselves to the wrong learning goals. That is, perhaps researchers are seeking learning in domains and asking questions regarding those domains that ignore and do not capture the kind of learning that visitors are actually engaging in when they visit the zoo. Perhaps the vision that the zoo community has for themselves in terms of learning processes and aims is at odds with how visitors perceive the zoo and what kinds of learning they are seeing or engaging in themselves.

**Beliefs and conceptions of zoo education**

In Fraser and Sickler's (2009) study of four zoos in New York City that are managed by the Wildlife Conservation Society looks precisely at this kind of issue in their examination of the *Cultural Impact of Zoos and Aquariums*. As we noted earlier, the writers of this article were asked to address the extent to which zoos are successful in influencing attitudes towards conservation issues and action. The approach of this research was quite unique in that, rather than solely targeting the public that visits zoos, Fraser and Sickler tackled this issue by addressing all stakeholders that are involved in the public of the zoo. In addition, to conducting research with visitors to the zoo, their study also targeted zoo professionals and volunteers themselves as well as members of the business community and individuals who might not be visiting the zoo. In this way, Fraser and Sickler's research helped to capture significantly distinct conceptions of the zoo, its educational possibilities and purpose between those intimately involved with the zoo and those who are not.
They found that zoo volunteers, zoo professionals, staff field biologists and teachers who had participated in zoo-facilitated programs were likely to see science learning as an important purpose of the zoo. This group of stakeholders saw science and natural history learning as “an important value of zoos and had a consequential connection to conservation actions” taken by learners (Fraser & Sickler 2009, p. 106). In contrast, however, Fraser and Sickler's researchers found visitors to be using the zoo in significantly more different and varied ways. This is especially in the case of families which other researchers have noted may account for some 80% of the population visiting zoos (Andersen 2003). Sickler and Fraser write that “each family used exhibits and experiences as [a] uniquely liminal...opportunity for important conversation, protective coverings on which to build a personal narrative for their group that is separate from the zoo's learning goals” (Fraser & Sickler 2009, p. 107-108). Fundamentally these family learning goals and values for visiting the zoo revolved around the children in the group and fell into three broad categories. For many, going to the zoo provides an opportunity simply for family bonding. Fraser and Sickler's research shows parents using the trip to the zoo in different ways to engage in bonding with their children. They write that parents place a great deal of importance on the visit on the social aspect of the zoo visit and sometimes seeing it as the principal and sole value of visiting the zoo. Echoing this sentiment, a mother interviewed during the course of this research commented that “I spend a lot of time with my son in [the] monkey house...I don't really like zoos, but it's worth it for the time with my son” (Fraser and Sickler 2009, p. 108). Like this woman, other parents similarly expressed their interest in a zoo visit having more to do with their interest in being with their children and observing their enjoyment at the zoo rather more than in observing the animals themselves. Fraser and Sickler write that
these parents could fall into the category of facilitator as envisioned by Falk et al (2007) in the MIRP study. However, Falk's categorization refers to the visitor’s role in facilitating others’ learning, while Fraser and Sickler speak of the zoo’s role in facilitating family bonding time through providing the opportunity for “activities that make their children happy and a concentrated period spent doing things together” (2009, p. 108). While misunderstanding Falk's use facilitator for the purposes of their own discussion Fraser and Sickler's discussion strongly indicate a conception of the zoo's purpose, as seen by zoo-going public, quite different than that conceived by zoo professionals themselves.

The other two categories of learning goals for families revolved around the opportunity to provide first-hand experiences with live animals to their children as well as these same experiences for serving in their children's “moral development” (Fraser & Sickler 2009, p. 108). In both cases a significant cause of concern for parents was the exceptional opportunity that the zoo provides children, in the urban environment of New York City's zoos, to connect with living animals and nature that they might not otherwise have. Parents who were concerned with limitations of the urban environment saw a visit to the zoo as a critical part of their children's intellectual as well as emotional development through the experiences with live wild animals (wild in the sense that they are in no way domesticated). Those seeing a zoo visit as facilitating children's moral development also approached this value with the opportunity of the zoo to mitigate the dislocation and disconnections with nature that an urban setting inflicts on children. These parents saw the zoo providing an opportunity for developing respect for animals and the natural world in their children with these values as “crucial to being a good, humane person” as well as instilling empathy and broader sensibilities of morality (Fraser & Sickler 2009, p. 108).
Instead of science learning, these families emphasized the opportunity to teach and engage children to take the perspective of another living being through considering the needs and wants of the zoo animals. The fundamental purpose and value of the zoo for these individuals is to help their children to learn not only how to care for animals and other people but also how to be “good world citizens” in doing so (Fraser & Sickler 2009, p. 109).

What is particularly interesting, is that not only are family groups using the zoo to develop the moral character of children through the institution's role as mitigator in an urban environment. In addition to this, families are using the zoo visit and the zoo animals in other interesting ways to develop moral character as well. Some parents used the 'family' groupings seen in the zoo animals as “examples of the importance of close family relationships” citing that “love, bonding and mutually supportive relationships are consistent throughout the animal world and something to which they should aspire as well” (Fraser & Sickler 2009, p. 108). The parents who described this use of the animals and exhibits were individuals who had negative experiences with abandonment in the course of their lives and were focused on the opportunity to use animals and their relationships as ideals to be emulated in human relationships and behavior. This uses the zoo and its animals in somewhat different ways than those parents who focused on the zoo connecting their children to the animals as proxy for connecting them to nature and developing 'good' moral character.

These insights from Fraser and Sickler suggest a few things with regards to our look at earlier studies on adult's zoo learning. Firstly, this research suggests that perhaps there is a significant disconnect between the zoo community's conception of its educational purpose and aims. Secondly, it suggests a disconnect between the learning aims that researchers are assessing...
zoos for and the learning aims actually held by adults visiting the zoo. Both of these reasons may explain why these studies aren't capturing adult learning that is going on and learning that zoo professionals are convinced is happening despite research evidence suggesting the opposite. Beyond this, however, it may be that this research offers insight of another kind. That is, it may be the case that the great majority of adults visiting the zoo, four fifths of visitors are indeed family groups, are focusing their energies on facilitating their children's learning to such an extent that they are not attending or engaging in new learning for themselves. Perhaps adults are learning little or nothing from their visits to the zoo because they simply are not engaged in trying to learn for themselves and the real learning that is occurring at the zoo is happening with their children. It is these insights in conjunction with strange preoccupation of zoo learning research on adults that make the next piece of research so intriguing.

Learning impact study of a visit to the zoo- for children

Conducted in part in response to criticism from activism groups such as the Royal Society for the Prevention of Cruelty (RSPCA) to animals, the Zoological Society of London (ZSL) engaged in an extensive study of the children's learning at the London Zoo in the context of informal learning at the zoo as well as in the context of educational presentations at the zoo and outreach presentations to schools (Jensen 2011). This kind of criticism comes from the ethical debate of the use and justification for the continued existence of zoos and the maintenance of captive animal populations within them. The zoo community itself has submitted in documents such as WZACS, the AZA's MIRP study, and others, that the zoos are justified by their continued role as educational institutions and their purpose in educating the public on
wildlife, conservation and sustainability issues. Unfortunately, critics like the RSPCA have pointed to the failure of the zoo community to demonstrate that these educational aspirations are actually being met. They point to the same research that we have looked at that, if anything, seems to say that zoos are not at all meeting their educational mission. If this is indeed the case, then it is a very real question as to whether zoos are worthwhile to exist, as even the best zoos cannot provide a fully natural living experience for their collections.

Recognizing the limitations of previous visitor learning research as well the striking lack of it, the ZSL devised this study hoping to provide the robust and critically needed research demonstrating the effectiveness of zoo education. Using a number of qualitative and quantitative data collection methods the study was able to produce robust conclusions about children's learning at the zoo and show that, perhaps unsurprisingly, children learn a great deal from visiting the zoo. For the purposes of their study and measuring the impact of the zoo on the children's learning, this study focused on exploring the impact of the zoo on children's understanding of habitats and animal adaptation. The study's sample came from primary and secondary school children who visited the London Zoo in the context of a pre-existing program established by the Zoological Society of London and the Greater London Authority which supported private and public schools in visiting the zoo and receiving outreach presentation visits (Jensen 2011).

This research of a large sample of over 3000 students used pre- and post-visit surveys adjusted separately for primary and secondary school children to collect quantitative data while also soliciting each child to include a drawing of a favorite habitat and the living things in it, plants and animals. In addition to producing this drawing each of the respondents were asked to
include notations on the drawing to describe what was depicted and aid the researchers in coding these pictures for their data. These surveys and drawings were completed by all children upon entering for the visit and upon exiting with the intent to capture changes as a result of their visit. Each of the survey questionnaires was the same for both primary and secondary school children with the exception of three additional survey measures for secondary school children predicated on their ability to respond to more complex questions. Critically important for some of the researchers’ later results, the questionnaire asked for basic demographic information including age and gender, which later allowed the researchers to analyze learning impacts with respect to these variables. Furthermore, the questionnaire also asked students whether they had visited a zoo prior to their current visit. This also became important in the picture of zoo learning that emerged in the researchers’ results.

In addition to these items, all students were asked to address items assessing the students’ perceptions of the purpose and function of zoos. Students were asked whether they agreed that the purpose of zoos was for having fun, learning about animals, seeing animals, saving animals from extinction or for other reasons. They were also asked to list their thoughts in response to the question, “what do you think of when you think of the zoo?” (Jensen 2011, p. 10). In addition to these pieces, secondary school children were also asked to indicate their feelings of scientific and conservation self-efficacy. These items referred to students feelings of capability in scientific fields and capability in making a difference in wildlife conservation. Furthermore, secondary school children were assessed for feelings of concern for wildlife conservation by asking them whether they felt “personally concerned about species going extinct” (Jensen 2011, p. 10). The post-visit surveys differed from the pre-visit surveys by removing the question on
previous zoo visits and adding items that were post-visit only, revolving around the children's level of enjoyment during the zoo visit as well as their perception of guided presentations they attended, if any. These measures primarily only differed in terms of wording and language between the primary and secondary school questionnaires. The only other manner in which they varied was in the use of a smiley face Likert scale for primary school children to indicate their enjoyment of a presentation whereas the secondary school form used a verbal scale (Jensen 2011). The final data collection measure asked professional zoo educators to take note of basic information about the visiting school groups (school name, class year, visit type) and the behavior and tardiness of the group in the event they attended educational presentations.

The robustness of this study by the Zoological Society of London helps a great deal in enhancing the trustworthiness of its striking and encouraging (if you believe in zoos) results. Most importantly, this study did find that there was a “strong statistically significant increase in scientific learning about animals and habitats (increase in knowledge) from pre- to post-visit” which contrasts tremendously with the weak results from the studies discussed earlier (Jensen 2011, p. 4). Strengthening this the study found that a full 91% of the sample had positive changes in “at least one educational, conservation-related, satisfaction or enjoyment outcome variables” (Jensen 2011, p. 4). Beyond this, the study was able to show a significant impact of the zoo visit in altering perceptions around zoos and conservation issues as well, a cultural change in attitudes that is both critical to meeting the zoo community's learning aims as well as, perhaps, the survival of zoos as institutions in modern society. On the students' listings of concepts that they associate with zoos, “'learning' moved up from the 11th (Before) to the 3rd (After) most mentioned concept associated with the zoo” and “'habitats' moved from 9th...to 4th”
which is taken to indicate that children “increased their perception of the zoo as associated with scientific learning and concepts” (Jensen 2011, p.5). As this indicated an increase in positive perceptions of the zoo and its purpose there was also a similar movement in the decrease of negative perceptions about the zoo with 'cages' in particular being significantly less associated with zoos after the visit compared to before. Finally, there was also statistically significant increases from the visit in the amount of support for notions that “zoos are for learning about animals” and “zoos are for saving animals from extinction” (Jensen 2011, p. 5) which significantly moves children's perceptions of the zoo's purpose in line with the purpose of zoos as conceived of by the zoo community itself. In addition to these general results, its also important to note that the ZSL study was able to produce interesting results with regards to differences in learning with regards to age, gender and repeat visits to the zoo.

With regards to age, the study found that older children (aged 11-15) showed fewer positive changes in their drawings from pre- to post- visit than younger children (7-10 years old) although, overall, children of all ages were more likely to produce positive changes in their drawings than either negative changes or no change at all (Jensen 2011). As children age, perhaps, a visit to the zoo has less to teach them than at younger ages. This not certain, but if it is the case then perhaps this may also have implications for understanding the apparent lack of learning that adults experience from their visits. Perhaps in concert with this notion, the ZSL study also found that the level of satisfaction with educational presentations at the zoo increased with age.

With regards to gender, the results of the study indicated some small, but perhaps, important differences between boys and girls in the study. Girls were slightly more likely to see
the purpose of zoo visits for enjoyment and for seeing animals after visiting the zoo. Boys were more likely to see zoos as places for saving animals than girls were. Girls were also more likely to see zoos as places for learning both prior to and after their visit to the zoo although both boys and girls showed an increase in this perception as a result of their visit. Perhaps the most interesting result is that study showed there was no difference between boys and girls with regards to feelings of self-efficacy in science or in science learning. Jensen (2011) writes that this is interesting in light of research that has suggested bias against girls in other scientific domains. However, previous research on museums and informal science learning environments in general has shown that zoos and the biological sciences are typically an area where such a gender bias against girls does not exist and that, if anything, frequently the gender difference is in the other direction (e.g. Baram-Tsabari & Yarden 2008, Borun & Chambers 2000, Joyce & Farenga 1999). So this last result is less noteworthy than the ZSL report suggests.

The last piece of particular note that comes from this study is the what is learned about the effects of repeat visits to the zoo. While the ZSL study does not find a difference in learning levels or increases in knowledge, between children who are visiting a zoo for the first time and those who have been to a zoo before, there are significant effects of prior visits to a zoo on other aspects of the zoo visit and the learning experience at a zoo. In particular, the familiarity with zoo environments that prior visits provide seems to lead to increased familiarity with and support for the purpose of zoos as conceived by the zoo community itself as well as enjoyment of the experience. Children who had been to a zoo prior to their visit at the London Zoo were more likely to see the visit as a fun experience than children who are visiting the zoo for the first time. Children who were familiar with a zoo before were also more likely to see zoos as places that are
“saving animals from extinction” in entering surveys while results from the post-visit survey furthermore suggest that in general children are more likely to see this purpose for zoos if they have visited a zoo at least once, which includes the instance when they engaged in this study (Jensen 2011, p. 16). Similarly, children who have been to a zoo before are more likely to be concerned about species extinction prior to visiting the zoo while by the time of the post-visit survey there students who were visiting the zoo for the first time were just as likely to indicate personal concern for species extinction. This as well suggests that a visit to the zoo has a significant impact on children's concerns for extinction.

Repeat zoo visitors were also more likely to see zoos as places for seeing animals than children who were coming to the zoo for the first time. Lastly, and perhaps most interestingly, children who had visited zoos before were more likely to feel capable of taking action on wildlife conservation issues than children who were visiting for the first time. This was the only instance which did not even out in difference by the post-visit survey and suggests a cumulative impact of multiple zoo visits on this kind aspect of learning at the zoo (Jensen 2011). This is a critically important insight which, while only seen in the the ZSL study in with regards to this one instance of learning suggests two things. Firstly, it suggests that other aspects of learning and education from the zoo may be most effective or only effective over the course of multiple visits. Certainly this is an aspect of the zoo learning experience that would not be captured by single visit impact studies like the MIRP and that of the BIAZA. This is a notion that Balmford et al (2007) referred to in their study as well. The other issue that this may lead to is consideration for the notion that perhaps there is a carrying limit to cumulative zoo visits. That is, perhaps there is a point at which further zoo visits no longer affect particular aspects of zoo learning. Perhaps this is a
point at which individuals find nothing new to learn from subsequent zoo visits. If this is the case, perhaps this is what zoo visit impact studies have captured in adults. Perhaps, it is the case that many adults who are visiting zoos have visited zoos significantly enough that they have wrung all the learning they can out of the zoo experience already. If, as the MIRP study suggests (Falk et al 2007), the people who visit zoos are a self-selecting group and therefore are the type of people who like and visit zoos, then perhaps they have learned all they can from zoos over the course of their many previous visits.

The other piece that is interesting about the ZSL study is that it is one of the only studies in the zoo research literature that actually takes a significant look at the other realm of zoo education that I have referred to as the non-formal learning context which includes more programmatic activities. In this case, the ZSL study is concerned with measuring the added impact of educational presentations, given by professional zoo educators, on learning experiences with the zoo. In this, the researchers for this study found that educational presentations had a tremendous impact on learning at the zoo. In fact, the study found that groups who attended presentations in addition to their visit show nearly twice as much learning as those children who did not (Jensen 2011). This suggests that educational presentations and other tools that facilitate exhibit interpretation help children to better connect the animals that they are seeing in the zoo to the wild animals, habitats and conservation concerns of the broader biosphere and even in contexts far from the zoo.

Knowledge- What is known from the non-formal context?

On this it is noteworthy that the educational context of zoos that remains relatively

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unexamined by researchers on zoo education is indeed the non-formal educational context. On the one hand this is perhaps sensible since the vast majority of individuals interact with the zoo in the informal context and the interest of the zoo community is in maximizing their educational impact. However, it seems strange that researchers should largely ignore the most inherently active of zoos' educational activities, of which there are many.

An excellent example of the kind of impact zoos can have through non-formal educational activities is that of the Madagascar Fauna Group which manages a zoo in Toamasina, Madagascar. In “Sustainable education at a developing-world field site: developing programmes linked to conservation work in country” Freeman describes the learning and teaching activities that their zoo and organization are engaged in. Recognizing that zoos provide the opportunity “for spreading conservation messages to a wider audience than may normally be accessible” the zoo engaged in multiple educational projects with the local community (Freeman 2009 p. 114). Beginning with organizing visits for local children to the zoo, the group soon expanded to establishing a “Saturday Schools” to supplement local educational provision. These “Schools” hired qualified local teachers primarily to provide instruction in mathematics and French language but also earmarked a fifth of the program for providing children with theoretical and practical grounding on conservation and other environmental topics. The “Saturday Schools” engaged in providing lessons to children from villages surrounding the zoo. This population typically saw only 4% of children completing exams for entering secondary school, however, the efforts of the “Saturday Schools” eventually led to between 70 and 80% of children passing these exams, a tremendous increase (Freeman 2009, p. 115). The MFG group also encouraged parents to keep their children attending schooling in general by providing funding for the brightest local
students to pay for materials and typical school fees. Finally, the zoo group was able to provide week-long camps for older children during holiday periods to allow them to engage even further with environmental topics.

Beyond these programs for local children, the MFG also engaged adults in the community. In one program it developed educational materials and trainings for local teachers to engage in environmental education. Over the course of three years, 365 local teachers were able to be trained through this program which led to the inclusion of environmental education lessons in schools. To combat unsustainable farming techniques, such as 'slash and burn', the zoo engaged with local farmers, government officials and agricultural colleges through an “Agricultural Model Station”. This station provides the opportunity to demonstrate sustainable agricultural techniques for farming, beekeeping and vanilla production (Freeman 2009, p. 118). With a team consisting of local men trained in these techniques and being employed full time by the MFG, the station allowed visitors to attend freely and also developed trainings for farmers, engaging them in learning about terracing, composting, tree planting and other sustainable activities. Farmers who participated in the trainings as well as anyone else could always return to the station to receive follow-up advice and seek further guidance on the techniques they were learning. In addition to these programs, the Model Station was also able to engage local communities in managing tree nurseries and being trained in reforestation techniques. Finally, in addition to environmental education training and the Agricultural Model Station, the MFG zoo established partnerships with the Institute of Natural Resource Management at the local University in Toamasina. These partnerships included assistance in developing the Institute's facilities, providing a site for field study, developing its degree programs and providing financial
support for student projects as well (Freeman 2009).

The kinds of educational activities and partnerships that this zoo in a developing world country engages in are not dissimilar from some of the activities engaged in by zoos in the developed world as well. Multiple zoos in the United States, Europe and the United Kingdom engage in the provision of non-formal educational activities and partnerships like those of the Parc Ivoloina zoo in Toamasina. It has become virtually standard practice for many of these zoos to offer yearly summer camp activities and, like Toamasina, a number of zoos have partnered with local universities and schools to provide academic and research programs as well. It is surprising, therefore that there is hardly any presence of research assessments of the effectiveness of these kinds of zoo educational activities. This is especially so since, presumably, zoo educators have more control of the type and delivery of content and, therefore, greater potential for effectively delivering the educational messages and meeting the educational aims which zoos as a community desire. The evidence of the impact of educational presentations at the London Zoo over and above an informal educational visit by itself certainly seems to support this notion. In light of how often zoos engage in these kinds of educational activities, it is particularly surprising how little these are present in the literature around zoo education and learning and how little they are looked at as objects for evaluation and assessment.

With the exception of articles that discuss or mention the existence of programs like these such as Freeman's (2009) article about the Madagascar Fauna Group and articles by Andersen (2003) which really provides merely an overview discussion of the kinds of educational offerings in zoos, non-formal education activities are addressed few and far between. Among the few articles that are present in the literature is a study conducted by Disney's Animal Kingdom,
which examined the effect of the park's Conservation Station on visitors' long-term engagement in conservation action (Dierking et al 2004) through the use of a behavioral change model. For this study, long-term impact meant the persistence of conservation action behaviors over the course of two to three months following a visit to the Station. Unfortunately, however, the study's results showed the impact of a visit to the Station was only minimally sustained over the months following the visit with the exception of sustained interest in helping to improve wildlife habitats. Another article from educators at the Ocean Park in Hong Kong details an educational program to tackle overfishing through their Sustainable Seafood Programme (Leong et al 2010). This article does include a discussion of the program's self-evaluation methods to evaluate the effectiveness of their program for the purposes of modification and improvement. Finally, an article in the same issue of the International Zoo Educators' Journal discusses efforts of the Chester Zoo in Britain to support and develop environmental education programming with a local organization in Mauritius (Esson et al 2010). These articles, however are in the minority for representing zoos' non-formal education activities in the literature and in the same 2010 issue of the International Zoo Educators' Journal, the opening article addresses the lack of assessment and evaluation that goes into non-formal education programs at zoos (Lehnhardt 2010).

**Knowledge: Summary of what we know about zoo learning**

So, what can we say to actually know about zoo learning and education from the literature? In truth it seems that we can say much more about what we don't know on the subject than what we do know. From the literature we can say very little about the effectiveness of zoos in their educational activities although at least with regards to the research focus on what adults
are learning from zoo interactions if anything it seems all that we can say is that adults aren't learning much of anything. At the least, certainly, the research has failed to demonstrate that the informal learning context is successful for this demographic.

On the other hand, from the study conducted by the Zoological Society of London it does seem like we can say that at least children are learning from their visits to the zoo and even more so when those visits are supported by non-formal educational activities such as presentations led by zoo education professionals. However, we are limited in our ability to conclude broadly from this study since it is focused on the particular context of the London Zoo and with a distinct lack of further research assessing children's learning at other zoos. It seems, however, that if zoos are looking for demonstrable instances of learning from their efforts that children should be a focus of future research efforts. Certainly the ZSL study suggests that children at the London Zoo were more successfully meeting the learning goals that the zoo community envisions for itself than adult visitors examined in either the MIRP or BIAZA studies, although even the research literature on this group is thin.

The one area with regards to zoo education that we can say is solidly well-known is the learning aims that zoos and the zoo community envision for themselves. At the least, we can say with relative certainty that zoos endeavor for visitors and participants in their activities to gain a broader awareness and understanding of wildlife, natural history, wildlife and ecology especially in connection with modern conservation and sustainability issues. On this point in particular, the zoo community is quite clear on its desire not merely to increase awareness for these issues, but it is critically interested in raising concern for them as well as raising the ability of individuals to feel capable of actively and positively effecting these issues on a personal basis. Fundamentally,
zoos want the public to recognize the interconnectedness of all species and habitats across the globe, to feel responsible for repairing and maintaining this biosphere and, ultimately, to feel like there is something they can do about it. Clearly the zoo community feels like their institutions have the critical mission and capacity to support this mission throughout the world.

**Zoos and International Education**

In the previous section we were able to see that zoos as a community feel strongly about and are deeply committed to their particular educational mission and we can also see that, despite research to the contrary, the zoo community strongly believes that they are capable of meeting this educational responsibility. The question becomes for those in the international education field; So what? What can the field of international education find of interest or importance in zoos and zoo learning; why should it care? In this section we will discuss why zoos should matter to international education. Some of the reasons for this are quite straightforward with regards to what zoos are already doing and where they are, other reasons stem from the multiple areas that are under-researched and unresearched with regards to zoos and still other reasons are concerned with the character of zoo education research publication and the apparent nature of professional zoo networks which remain to be examined and considered.

The most straightforward reasons that zoos should be of interest to the international education field is that many zoos are already behaving as educational institutions, zoos are an international phenomenon and, in particular, more zoos in fact exist in the presumed developing areas of the world than are actually present in the 'developed' West and North. In fact in her book, *The Welfare Ark* (whose focus is actually to critique zoos’ activities on ethical grounds),
Margodt (2000) cites statistics from an earlier World Association of Zoos and Aquariums Conservation Strategy that show the majority of the world's zoos and zoo visitors are outside Europe and North America. By these statistics zoos in Asia, alone, account for 545 of a then total of 1200 WAZA zoos world-wide with 308 million visitors annually out of 621 million people visiting zoos around the world (Margodt 2000, p. 103). Between Africa, Asia and Latin America more than half of WAZA's zoos are outside of Europe, North America and Australia. The mere presence of zoos internationally would not be sufficient to attract the notice of international education if it were not also the case the zoos throughout the world were not also acting and engaging as educational institutions, which in fact they are. As we have already seen with the WZACS strategy (2005), the BIAZA's research in the United Kingdom (Balmford et al 2007), the MIRP project in the United States (Falk et al 2007), and the ZSL study in London (Jensen 2011) zoos are not engaged as simple educational institutions acting solely within the confines of their exhibit grounds. Rather, a number of zoos are engaged as multi-faceted complex educational institutions that engage in their educational mission through informal and non-formal learning opportunities, partnerships and outreach with schools, universities, community organizations and the support of international programs as well. As we saw in the case of the Madagascar Fauna Group's (Freeman 2009) and Chester Zoo's efforts (Esson et al 2010), zoos are also engaged in educational programming beyond the immediate learning aims of the zoo community itself and can, in fact, be engaged in supporting and facilitating basic educational development as well.

In conjunction with the international presence of zoos, this point should be of particular interest to the international education field and is also of particular interest to zoo researchers.
themselves. One of the central arguments for the educational mission of zoos as well as critical justification for their continued existence as institutions, despite real ethical concerns, is the role zoos see themselves playing especially in a world with both growing urbanization and growing income disparities. We saw earlier in Fraser and Sickler's (2009) research at zoos in New York city the value multiple parents placed on the importance of the zoo particularly in their urban environment. In fear of the disconnection and dislocation from natural environments and wild animals caused by urban life, these parents saw the zoo as critical in mitigating these disconnections for their children and providing critical opportunities in their children's intellectual, emotional and moral development as human beings.

In the preface to their study of visitor impacts at United Kingdom zoos, Balmford et al expressed their own concern with this very phenomenon writing that, “humanity is growing ever more disconnected from wild places and wild creatures...over 50% of people now live in towns and cities, and their numbers are rising by 160,000 daily” suggesting the importance of zoos will only grow in the future (2007, p. 120). At the end of their study Balmford et al heighten the importance of this point particularly for zoos in developing world countries writing that the results of their present study in the United Kingdom “say nothing about the impacts of informal or indeed formal zoo education on two, arguably more important zoo audiences- children, and either adults or children in developing countries (where most biodiversity occurs, yet where rapid urbanization means that the public are becoming increasingly isolated from wild nature)” (2007, p. 134). The ZSL study echoes the important role zoos play in this situation writing that the 'distanciation', as they call it, from wild environments caused by urban living “is addressed by parks and zoos that provide access to animals and the natural world, which would otherwise exist
for some children and young people only as cultural imagery, mediated through television, films and books...the experience of viewing animals 'live and in person' can have a powerful impact on children and adolescents, interacting with pre-existing cultural representations to construct new understanding of wildlife, and the role of humans intervening in this natural world” (Jensen 2011, p. 94).

Other researchers have likewise noted the importance that zoos play in better representing natural animal behaviors than other media, particularly film documentaries, have the capability of doing so. An excellent example is the behavior of lions. An hour long documentary of lions will often depict the animals in a great deal of activity, whereas a visit to a quality zoo, would find the animals spending a lot of time resting and inactive (Andersen 2003). This is a significantly more accurate depiction of typical lion behavior as the animals, and cats in general, usually spend the majority of their day (between 18 and 20 hours) sleeping. The difference between animal behaviors that can be depicted on film and television and the range of behaviors that can be displayed by animals in zoos is a critical point when considering the role that zoos play in an increasingly urbanized world. In light of the ethical concerns regarding the maintenance of captive wild animal populations in zoos, one might argue that films and television are sufficient to take over zoos' role in connecting people to wild animals and environments and eliminating the need for zoos altogether. The notion that film media is limited in this role reinforces the continued importance of zoos in their institutional and educational role.

However, despite the relatively clear potential importance of zoos in this educational arena and in this role internationally particularly in developing world settings, the research literature and discussion on education and learning activities in zoos finds itself largely focused.
in the West and largely looking at zoos based in the United States, Europe and Australia. Articles like that of the Madagasacar Fauna Group (Freeman 2009) discussing a zoo in Africa or that discussing activities at institutions in Hong Kong (Leong 2010) are the rare exception to the rule of the discussion as well as the rare exception to the rule not only of where researchers are located but of the institutions that are researched and represented in the literature. Institutions such as the Bronx Zoo (Fraser & Sickler 2009, Falk et al 2007) and Animal Kingdom (Falk et al 2007, Dierking et al 2004, Dierking et al 2002) in the United States, the Chester Zoo (Balmford et al 2007, Freeman 2009, Esson et al 2010) and London Zoo (Balmford et al 2007, Jensen 2011) in the United Kingdom and the Melbourne Zoo (Ballantyne & Packer 2009) in Australia are noteworthy for frequently appearing both as research venues and research originators within the literature.

So while some pictures may be emerging of education and learning in the context of these zoos, we have virtually no picture of zoos in the literature from precisely those areas of the world that Balmford et al (2007) expresses the most concern for. Moreover there is a great extent to which this literature tends to speak of its research results with broad applicability to zoos in many contexts. The MIRP study (Falk et al 2007) is particularly noteworthy in these pretensions. As we noted earlier, the researchers in this study purported to have reached conclusions that could be considered representative for zoo and aquarium-going populations throughout the North American continent despite the fact that all of the twelve institutions involved in all phases of the study were based entirely in the United States (see Falk et al 2007 p. 2). Not even a single institution from Canada was included that might have vaguely warranted extrapolation of the results beyond the United States. In the literature reviewed for this paper,
not a single article, on education, was encountered that was either produced by or represented research conducted in any other institutions in North America such that we lack any picture of the educational activities that are taking place, if any, in lower-resourced contexts on the continent. A similar void is present for virtually all the zoos in Asia and there is little ability to speak to the presence even of the conception of a zoo’s educational mission in this part of the world beyond the article from Hong Kong and the membership of Asian zoos within the World Association of Zoos and Aquariums. This is striking since these are zoos in some of the most ecologically, vulnerable, threatened and critical parts of the world. The fact that we lack a picture of these zoos should be of interest to the international education community and should also be an interesting area of research for the field to engage in.

Noting the extent to which the research literature on zoos and education is focused on and originates from particular parts of the world could also lead the international education field to be interested in the relationships between zoos internationally as well. There is certainly an area open for research of resource and power relationships within the community as well as resource and knowledge transfer within the community. This is an area that is not examined or in consideration within the zoo community but should be just as important in understanding and evaluating the educational activities and impacts of zoos just as much as it is a concern for international education in regards to schools. Certainly we can see some degree of North-South knowledge and resource transfer with the Chester Zoo’s involvement in its program in Mauritius (Esson et al 2010) and Freeman (2009) mentions the involvement of zoos from Europe and the United States in supporting the Madagascar Fauna Group’s activities as well. Even within the context of the United States it would be valuable to examine the relationships between research
and resources between different institutions as well as the relationship of research, resources and admission costs to costs of living in zoo contexts. At this point no such examinations exist and therefore no conclusions can be made about the extent of 'North-South' relationships among zoos or, if they are extant, the extent to which these relationships are negative or positive with regards to control and dialogue. Even organizations like the AZA and WAZA are unexamined for their affects as either gatekeepers or quality assurance organizations. Analyses of this kind are particularly crucial in light of serious ethical concerns about the existence of zoos that lack the resources to provide quality care for their animal populations, let alone providing quality educational opportunities. A final point in relation to the dominance of the reviewed research literature herein by 'Western' zoos and researchers is the extent to which literature and documents in other languages and other regional professional organizations addresses the holes in the English-language literature is unknown.

Beyond these broader areas of interest for the international education field in terms of researching and better understanding the community of zoos as well as the picture and nature of zoos and zoo learning in different contexts, there are more proximal areas of research that remain under-examined by the literature and in which international education could be interested. In particular, the relationship between gender and zoo learning, as well as other identity factors, remain woefully unexamined by the research literature. As we saw in our examination of zoo research literature, only one piece considered gender as a factor in their analysis, that being in the case of the ZSL's study. Beyond this, the literature is devoid of any articles looking at this issue.

We can, however, find some articles in a broader literature examining gender in the in context of museum learning. The highlights of this literature include a study conducted by Coon 58
Tunnicliffe (1998), in the United Kingdom, where she conducted conversation analyses of boy-
only and girl-only groups visiting different kinds of animal exhibits at a zoo and museum. Her
interest was differences in conversation between gender groups as well as differences with
regards to whether the children were viewing live animals, static dioramas, or robotic animals (ie
robotic dinosaurs). Her analysis showed significant differences in attention and connection to the
exhibits for boys and girls through the conversations they were having. Girls in this analysis
were significantly more focused on their relationships to the exhibit and its subjects as well as
relationships between subjects within the exhibit. Boys, by contrast, were significantly more
interested in factual aspects of the exhibit and the animals within. In a different study by Borun
and Chambers (2000) the researchers examined differences in adults facilitating family learning
with regards to gender. They found that when both genders were present females would take the
lead role in facilitating learning and also that there were no preferences in attention to boys or
girls in the group. The other small piece from this study, that we referred to earlier, is that this
study revealed that zoos were the one 'museum' context which they examined that showed more
girls than boys were visiting the institution. Beyond these pieces, however, no significant picture
exists of differences with regards to gender and learning in zoos. The picture of gender in this
context is so negligible that it remains difficult to even declare that these differences exist, let
alone to begin assessing whether gender differences in zoo learning experiences represent
problems.

Therefore, there is a wide open area for research regarding the interaction of gender, zoo
visits and learning at the zoo. It should also be noted that the two instances of gender in relation
to zoos that we have from the museum literature address solely the informal learning context and

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do not address the context of non-formal learning activities such as camps. Further research in this area could also address the potential role zoos could play in addressing gender gaps in education, particularly in the sciences.

Although we have seen the MIRP study engage in studying zoo visitors from an identity-related motivational standpoint (Falk et al 2007) and we have seen the lack of research with regards to gender, let alone gender identity, other critical aspects of zoo goer identity remain entirely unexamined. Specifically, no aspect of sociocultural context and zoo learning experiences is examined at all in this literature. Again the ZSL study (Jensen 2011) is somewhat exceptional in this instance as it did examine age differences in relation to learning as well as the influence of deprivation. In addition, the study by Fraser and Sickler (2009) may also be considered to loosely address cultural context. However, no study in this literature examined that impact that cultural context might have in visitors' relationship to the zoo, animals in exhibits and conservation issues broadly. We lack any picture of how culture influences knowledge change from zoo education nor how culture might influence attitudes and attitudinal change towards conservation concerns and actions relative to zoo education. Like gender, this is once again an area wide open to research and perhaps already extant insights from international education professionals.

In truth, with such a small number of known quantities around education in zoos present in the literature it is abundantly apparent that a great deal remains to be explored within this realm. Furthermore, as suggested by the literature herein as well as the lack of literature on particular topics it is quite apparent that there are many avenues of research available in the field in which international education could be involved.

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Conclusions

The fundamental focus of this project has always been to ask two questions: What do we know about education in zoos and how is it important to the field of international education? This project was oriented as such with the recognition that zoos' educational engagement is simply not on the radar of the international education field. An obvious part of the reason for why this might be is the lack of presence for literature on zoos and education within the literature that is typically sourced by the international education field. Not only is this literature not existent in the international education literature, its presence in general education literature is barely larger. As we noted at the beginning, the literature on zoos, education and learning is virtually entirely within journals internal to the zoo industry. These include principally the International Zoo Yearbook, Zoo Biology (incidentally both of which are published by the ZSL), and the Journal of the International Zoo Educators Association. Other literature is present in visitor, leisure and tourism studies journals as well as some presence in museum industry journals. With this literature self-contained within the industry this project's intent was to bring this literature into the awareness of a broader field of education for the purpose of asking how the two might contribute to each other.

As we found from our examination of the zoo literature, the existing research leaves us with little concrete information about the field. We do have a strong picture of what zoos desire to teach the public and what they see as their educational role within the world. However, in contrast we have a very weak picture of other aspects of the field. We do not have a clear picture of whether zoos are being successful in fulfilling their educational aims and, sadly, if anything...
the picture on that front is disappointing as regards adults. In particular we lack a clear picture in
the literature of non-formal educational activities that zoos engage in and even less of an
evaluative picture of these contexts than we do of the context of an informal zoo visit. Beyond
this we have little understanding of the nature of personal contextual factors as they interact with
and influence the zoo learning experience. So, on the one hand after reviewing this literature we
find ourselves with the rather depressing conclusion that we still don't know much about zoo
education and that much remains still to be researched and learned in the field.

Although this picture is frustrating we can also find this lack of research exciting and
intriguing both for zoo professionals and the international education field as well. We find that
there are indeed many avenues of research for the international education field to investigate and
be interested in zoos. From gender issues, to sociocultural context, to knowledge transfer,
resource difference, resource context and analysis of power dynamics within the zoo community
and in connection with the industry's professional organizations there is a wealth of pieces to
look at with zoos and learning. In addition to engaging the field with regards to research,
hopefully bringing awareness of the educational activities of zoos as institutions (particularly in
the area of development activities like the Madagascar Fauna Group and the Chester Zoo) to the
attention of international education professionals will also encourage the field to look at
engaging with these institutions internationally in common efforts to improve education access
and achievement around the world.

Ultimately awareness and opening the field is what this project was about, bringing the
literature on zoo education out of its confines within the industry into the awareness of the
international education field. The title of this literature review was chosen specifically to
illustrate this purpose. In zoological studies, such as entomology, identification of a species refers to the discovery of a new animal species previously unknown to the field and is accomplished with barely more than the giving of its scientific name. Especially, in entomology hundreds of thousands of such species exist. A description of a species, however, is the project to give an already extant, already identified, species its due by more closely and fully describing its morphology, behavior and life history beyond merely its name. A description of a species, therefore, is the shedding light onto something already in existence but poorly understood or unknown beyond this. With regards to international and comparative education, zoos are a similar animal. That is, zoos have been acting as educational institutions and engaging in educational activities for many years even in the absence of their consideration or awareness by a broader field. This project, therefore, offers the description of that species already extent for the greater awareness of the international education field. Hopefully, at the very least this project has accomplished that purpose by indicating where to look to learn more about zoos and to engage with the industry.

In truth, from an author's standpoint, this project has left me both more unsettled and more curious about the field than before. On the one hand the literature failed to contain as many concrete answers and pieces of evidence about education in zoos. On the other hand reviewing the literature was frustrating in light of personal experience with the zoo industry because it seemed to consistently represent an incomplete picture of education in zoos and perhaps even what may be known about education in zoos from documents that have been produced internally by various zoo institutions and not released publicly. On the other hand, the frustrations of the review are exciting because it leaves so many questions yet to be asked and
yet to be answered within the field. For any perpetually curious individual, this is at least provides some solace.
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