Zoo Education: A Comparative International Study of Zoo Intentions and the Visitor Experience.

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This dissertation is the report of an investigation submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy at Murdoch University 2014
Declaration of Authorship

I declare that this dissertation is my own account of my research and contains work, as its main content, which has not previously been submitted for a degree at any tertiary institution.

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Murdoch University Human Research Ethics Committee:
Ethics Approval: 2009/041

A note of formatting and style:
This PhD thesis comprises a number of research papers submitted to peer reviewed journals for publication. These documents are incorporated into the thesis along with additional text that has been provided to introduce and link the manuscripts. It is hoped that the final thesis presents a cohesive body of research that can be easily followed.

A note on caring for the environment:
To mitigate the carbon footprint generated by this project I have planted more than 400 native trees and 250 native shrubs throughout the project period. I believe that caring for the environment is a responsibility we should all embrace and express through positive actions.
Abstract

This research explores education within zoos on a global scale. Given that a central aspect of modern zoos’ mission is to educate their visitors, the research aims to understand how zoos describe, design and implement their education missions and how they evaluate the success of their education provision. The research also aims to understand the zoo experience from visitors’ perspectives, including zoos’ ability to engage in conservation communication through the various experiences encountered during a zoo visit.

The research focuses on four key concepts, identified as shortcomings of prior research: the reasons why people visit zoos, beyond their primary motivation; the extent to which zoos’ priorities are consistent with visitors’ expectations; the ways in which zoos provide education to their visitors; and the measures employed by zoos to assess education success. To achieve these aims, framed within a pragmatic paradigm, the study used a context specific, multiple site, mixed methods approach in which qualitative and quantitative data were collected from 191 zoos in 52 countries via an online questionnaire, and nine in-depth case studies.

The findings of this research, presented as four empirical manuscripts, indicate that the majority of zoo visitors (72%) arrive with a learning agenda, a view supported by the majority of participating zoos (75%). The findings also show that zoos currently view public education as their highest priority, consistent with visitor expectations. Furthermore, the research revealed that exhibit signage remains the most prevalent means by which zoos communicate their education messages. Although diverse communication types were reported and observed within zoos, their quality and educational value varied.

This research also evidences that zoo staff have a comprehensive understanding of evaluation and its potential value, but there is little indication that zoos evaluate their educational success from the perspective of student learning for the purpose of program improvement or development. Zoos seem heavily dependent on informal measures and are not completely apprised of their visitors’ needs, suggesting that current evaluation practices may not be providing the information zoos need.
Given these findings, the study suggests that zoos embrace the notion that visitors come to learn and ensure that the education provided is concise, consistent, legible and appropriately placed for maximum visitor engagement. The study’s findings also underline zoos’ need for detailed evaluation guidelines to enable them to evaluate their educational value from the perspective of student and visitor learning with the purpose of program improvement or development.
Acknowledgements

What an incredible adventure! I have had the opportunity to travel the world, see many rare and endangered animals and meet many dedicated and passionate people. I write these acknowledgements with mixed feelings, a sense of sadness that the project has come to an end and also a feeling of great excitement as I focus on sharing this information as widely as possible.

I would like to express my heartfelt gratitude and appreciation to my principle supervisor Associate Professor Andrew McConney who has walked every step of this journey with me. Andrew, my mentor and friend, has provided endless support, gentle guidance, invaluable feedback and constant encouragement. The skills I have learnt under his supervision have given me the confidence and aspiration to continue publishing and look towards further research.

I am also truly grateful to my co-supervisor Dr. Caroline Mansfield, who has provided encouragement, guidance and support with kindness and true professionalism. I also extend my thanks to the Murdoch University IT department, especially Luke Regan for his assistance and technical expertise.

I sincerely thank all the individuals from participating zoos who took the time to complete my questionnaire and welcome me into their zoos for case study research. The cooperation and assistance given by participating zoos and their governing associations has been invaluable and critical to the production of this project.

Finally, I wish to acknowledge my deepest appreciation and admiration to my family. I give thanks to my amazing boys, Jaxom and Ben, for their endless encouragement, support and understanding. Thank you also to Warwick and my mother Diana for believing in me and helping me find that elusive word!
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Study 1
DOI: http://dx.doi.org/10.1080/13504622.2014.940282

Study 2
DOI: http://dx.doi.org/10.2752/089279314X14072268687808

Study 3
DOI: http://dx.doi.org/10.1017/ae2015.1

Study 4
**Definition of Terms**

**General zoo visitors, general visitors and visitors:** refers to ‘through the gate’ visitors including tour groups but excluding school students participating in a zoo’s formal education program.

**Conceptualisation of learning within this project:** zoos participating in this study may have interpreted visitor learning in relation to their own mission statements and their desire for visitors to learn about key conservation issues. However, in this study, learning is conceptualised in a much broader way than just cognitively retaining messages given by the zoo and includes learning as perceived by zoo visitors. For example, seeing new and unusual animals.

**Formal education:** an organised, systematic educational activity with an explicit curriculum that is conducted within an identifiable space, designed for learning, and both the educator and student have clearly identified roles (Coombs, 1968; Edinburgh Zoo Workshop, 2005; Rogers, 2004; World Association of Zoos and Aquariums, 2005). In zoos and for the purpose of this study, formal education predominantly refers to groups of school children visiting with their teacher, usually with a predetermined educational purpose (Marshdoyle, Bowman & Mullins, 1982).

**Informal education:** pedagogic communication not guided by an explicit curriculum and offered by a zoo, to general visitors (Anderson, Lucas & Ginns, 2003; Edinburgh Zoo Workshop, 2005).

**Education communication types:** refer to any form of communication provided by zoos to their visitors, for the purpose of formal or informal education, including but not limited to taxonomic species signs; interpretive signs; interactive exhibits, modules and signs; verbal presentations, shows and displays; tours and docents; printed material such as worksheets, maps, brochures and pamphlets; digital media including television screens and cinemas; audio including soundscapes, recorded sounds and messages.

**Signs (at animal enclosures):** refer to taxonomic species information as well as interpretive signage.
**Interpretive signage:** 1) signs or graphics that provide answers for anticipated questions (such as *Why does that monkey have a purple bottom?*); 2) signs or graphics that provide information about animal behaviours that could be potentially observed by visitors (such as monkeys grooming each other) (Anderson, 2003).

**Evaluation:** refers to the systematic process of assessing the value of zoo education programs and provision with the aim of improving quality and gauging educational success.

**Formal evaluation measures:** any systematic method for gathering data, including but not limited to questionnaires, surveys or interviews whether they were conducted in person or electronically via the Internet.

**Informal evaluation measures:** includes anecdotal evidence gathered through casual conversations with visitors or casual visitor feedback, and non-systematic observation.
Chapter 1. The Research Project

For many decades zoos have been a popular family destination, a place to show children new and unusual animals while exploring spacious grounds enhanced by the call of gibbons, the roar of a lion or the chatter of chimpanzees. Considered by many as a place for leisure, entertainment and family fun (Kellert, 1979; Morgan & Hodgkinson, 1999), zoos located in bustling cities offer their visitors opportunities to ‘escape’ city life and enjoy lush gardens and a chance to reconnect with nature. Some authors claim that zoos are a valuable resource, and ideally positioned for providing conservation education to large groups of people and for reconnecting an increasingly urbanised public with the natural world (Gutierrez de White & Jacobson 1994; Hancocks 2001; Miller et al. 2004; Patrick, Matthews, Ayres & Tunnicliffe, 2007).

Considering our present ecological situation, the importance of visitors learning about conservation and sustainable living and achieving the potential of zoos as educational institutions is increasingly important. Collectively, zoos receive hundreds of millions of visitors each year (Smith, 2013 p. 42, estimated 426 million unique visitors worldwide; World Association of Zoos and Aquariums (WAZA 2004, p. 4) noted 600 million visitors) providing them with opportunities to observe living specimens up close and (most usually) embellished with information. Modern zoos claim to educate their visitors, to promote conservation actions and to actively contribute to environmental education (Patrick et al., 2007). To determine the validity of these claims it is important to understand how zoos describe, design and implement their education missions and how they evaluate their education success. It is also important to understand the zoo experience from visitors’ perspectives and zoos’ ability to engage in conservation communication through the various experiences encountered during a zoo visit.

The purpose of this research project is to gain a deeper understanding of education programming and provision in zoos from the perspectives of both zoos and zoo visitors. One of the first considerations was to appreciate the many different factors that are attributed to education provision within zoos and also the tremendous diversity of zoos on a global scale. It was important to understand that each zoo operates within a unique context, the sum of their social, political and economic position in the community. Given zoos’ contextual differences, thought was given to factors such as zoos’ mission statements and the priority given to education, the types of formal and informal
education offered in zoos and how zoos measured educational success. Zoo visitors were also considered, with regard to their motivations for going to the zoo, their learning agendas and their engagement with exhibit signage throughout their zoo visit.

All these factors contribute to the process of understanding education programming and provision in zoos and, as such, formed the focus of this project and led to the development of the following research aims:

- To study zoo education from both zoos’ and zoo visitors’ perspectives on a truly global basis, beyond the boundaries of zoo accreditation, across numerous social, cultural and economic fields.
- To broaden understanding of zoo visitors’ motivations and agendas, specifically to ascertain if learning is part of visitors’ agendas.
- To better understand the priority roles of zoos in modern times as perceived by zoos and zoo visitors.
- To empirically understand how modern zoos communicate with their visitors and the levels to which visitors engage with exhibit signage.
- To investigate the use of evaluation within zoo education, especially within zoos’ formal education provision.

Given the social complexity within the research aims and recognising the importance of the relationship between theory and practice (Greene, 2008) the conceptual framework that guided the research was pragmatism. A pragmatic approach provided methodological flexibility to use the most appropriate methods to answer the research questions and also the guidance to find practical solutions that zoos could use as a result of the research findings (Alexander, 2006; Johnson & Onwuegbuzie, 2004; Morgan, 2014).

To achieve the research aims, data were collected from zoos around the world via an online questionnaire and nine in-depth case studies. To present the findings, four empirical studies are provided, each addressing an aspect of zoo education, with a view to better understand zoos’ role as educators and visitors’ receptivity to conservation messages during their zoo visit. Within each study, a number of research questions were addressed (Table 1.1).
The research aims, the focus of each study and the development of the research questions emerged from an extensive literature review. Chapter 2 provides an overview of the literature relevant to zoo education and the visitor experience concluding with a discussion regarding conceptual shortcomings and methodological limitations identified in prior research.

Table 1.1: Research study titles and associated research questions.

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<th>Research Study Title</th>
<th>Research Questions</th>
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| Study 1: Do zoo visitors come to learn? An internationally comparative, mixed-methods study. | 1. Do zoos believe that visitors have a hope or expectation of learning when they visit the zoo and how does that compare to visitors’ responses?  
2. What do zoos report their general visitors want to learn and how is that determination made?  
3. What do visitors say they want to learn during their zoo visits and how does that compare to what zoos’ believe their visitors want to learn? |
| Study 2: The role of zoos in modern society – a comparison of zoos’ reported priorities and what visitors believe they should be. | 1. What do zoos report as their institutional priorities?  
2. What do visitors believe zoos’ priorities should be and how do they compare to those reported by zoos? |
| Study 3: How do zoos ‘talk’ to their general visitors? Do visitors ‘listen’? A mixed methods investigation of the communication between modern zoos and their general visitors. | 1. What types of education communication do today’s zoos report offering their general visitors?  
2. How do zoos’ self-reported types of education communication compare to those observed at nine case study sites?  
3. To what level do general visitors view exhibit signage? |
| Study 4: Using evaluation to prove or to improve? An international, mixed method investigation into zoos’ formal education evaluation practices. | 1. How do zoos think about or conceptualise evaluation?  
2. What methods or approaches do zoos use in the evaluation of their formal education programs?  
3. What are the barriers that zoos perceive to their use of evaluation? |
Chapter 3 presents an overview of the methodological approach used in the research project. The chapter begins by discussing mixed methods research and dialectical pragmatism and the construction of the research framework. Details regarding participants, instruments, data collection procedures and analysis and associated limitations complete the chapter.

Chapter 4 presents the empirical research. The chapter begins with a synopsis of key concepts studied and how they relate to each other and to zoo education as a whole. The four manuscripts, submitted to peer reviewed journals, each address a major focus for the overall research project: study one *Do zoo visitors come to learn? An internationally comparative, mixed-methods study* has been published in *Environmental Education Research*; study two *The role of zoos in modern society – a comparison of zoos’ reported priorities and what visitors believe they should be* has been published in *Anthrozoos*; study three *How do zoos ‘talk’ to their general visitors? Do visitors ‘listen’? A mixed methods investigation of the communication between modern zoos and their general visitors* has been published in the *Australian Journal of Environmental Education*; study four *Using evaluation to prove or to improve? An international, mixed-method investigation into zoos’ formal education evaluation practices* has been published in the *Journal of Zoo and Aquarium Research*. Each manuscript is briefly introduced linking the studies and highlighting their importance to our understanding of education in zoos.

Chapter 5 presents a synthesis of the main findings and discusses how the research studies come together to improve our understanding of education provision in zoos and the visitor experience. The chapter is structured around the research aims and includes potential implications for zoos and researchers who study education in zoos and the experiences of zoo visitors. Future research directions are then considered including suggested topics in need of further investigation that have the potential to improve zoos’ education provision and the visitor experience. The benefits and difficulties associated with mixed methods and multi-site research within zoos, as experienced with this project, are also discussed.
The conceptualisation of this research and the research aims were derived following an extensive literature review. This chapter provides a critical overview of the literature associated with zoo education and the visitor experience culminating in the identification of conceptual shortcomings and methodological limitations of prior research.

The literature review begins by addressing why education in zoos is important and the types of education zoos can provide, their presumed ability to educate visitors and the present shortage of evidence supporting zoos’ education claims. Literature relating to zoo visitors is then reviewed, including their motivations for going to the zoo and a discussion regarding the recognised need for multiple layers of experience and communication types to engage different learners. Zoos’ responses to the perceived benefits of offering diverse communication types is examined and concerns regarding an apparent lack of research into the most effective communication types are raised. The review then examines the use of evaluation in zoos including the potential use of evaluation for evidencing education success.

**Zoos as Educational Institutions**

The need to educate communities about conservation and encourage sustainable living is critically important (Hungerford & Volk, 1990; Keen, 1991; Newhouse, 1990; Patrick et al., 2007) given the many pressures on the natural environment including soaring extinction rates (Nakamura, Monte-Luna, Lluch-Belda & Lluch-Cota, 2013), rapid deforestation (Hancocks, 2001), global climate change (Balint et al., 2011), population growth, urban sprawl and an ever increasing demand for resources (World Economic Forum 2011). Zoos have been actively engaged in education, to varying degrees, since the 1940s (Peart, 1993). However, due to the points noted above, the importance of education in zoos has risen in priority during the last few decades and over that time zoos have increasingly promoted themselves as education institutions (Packer & Ballantyne, 2010).

Today, most zoos provide educational experiences to their visitors offering both formal and informal education within their institutions. School children visit zoos with their classroom teachers to participate in zoos’ formal education programs, generally
accepted to include an organised, systematic educational activity with an explicit curriculum conducted within an identifiable space, designed for learning, in which both the educator and student have clearly identified roles (Coombs, 1968; Edinburgh Zoo Workshop, 2005; Rogers, 2004; World Association of Zoos and Aquariums (WAZA), 2005). The majority of zoo visitors however, experience informal education, pedagogic communication that is not guided by an explicit curriculum and which contributes to an accumulation of knowledge achieved by the experience of daily activities, lifelong and self-directed learning (Rogers, 2004; WAZA, 2005). The most prevalent communication examples are interpretive and taxonomic species signs located at each animal exhibit (Arndt, Screven, Benusa & Bishop, 1992; Serrell, 1981) and zookeeper talks (WAZA, 2005). For learning to occur, the zoo must provide the type of information desired by the visitor in an appealing format that encourages the visitor to engage in free choice learning. Free choice learning describes the process an individual experiences when their own unique curiosity and interests guide their learning (Falk, 2005).

**Zoos Educating Visitors**

Zoos’ potential to educate general visitors has been well researched (see Bramley, 1989, 1992; Case, 1980; Churchman, 1984; Dierking, Burtynk, Buchner & Falk, 2002; Marshdoyle, Bowman & Mullin, 1982; Moss & Esson, 2013; Packer & Ballantyne, 2010; WAZA, 2005). Churchman (1984) noted that zoo education is more than the acquisition of facts and increasingly encompasses developing positive attitudes, especially for children. Bramley (1992) discussed the benefits of zoos delivering messages in such a way that makes visitors laugh or smile, explaining the positive psychological and social bonding effects which have the potential to improve repeat visits and thus further exposure to conservation education. Marshdoyle et al. (1982) comment that zoos that work with school teachers guiding students from ‘identification of’ towards ‘identification with’ (p. 25) would more effectively achieve zoos’ conservation education goals. Dierking et al. (2002) state that while studies have cited zoos as being capable of positively influencing their visitors, these claims have not been substantiated or verified, a comment supported by Falk, Reinhard, Vernon, Bronnenkant, Deans and Heimlich (2007). In addition, research conducted by Adelman, Falk and James (2000) determined that visitors to the National Aquarium in Baltimore (United States of America) lost their initial enthusiasm and commitment to conservation only weeks after visiting the aquarium. Kohl (2004) disputes the education achievements
made by zoos stating there is little evidence to support the claims that visitors’ attitudes towards positive conservation actions have changed after a visit to the zoo, a perception also supported by Swanagan (2000).

Studies have shown that today’s visitors arrive at a zoo with a more sophisticated knowledge of animals and the environment than that expected by the Association of Zoos and Aquarium (AZA) Conservation Education Committee (Falk et al., 2007; Vernon & Boyle, 2008). Falk (2005) contended that many zoo visitors already have an understanding of conservation problems and zoos could be more effective by offering visitors ‘simple, practical and concrete steps they could take to make a difference’ (p. 276). These considerations highlight the importance of understanding the underlying interests and motivations of zoo visitors.

**Motivations of Zoo Visitors**

Visitor motivation research is dominated by museum experiences, rather than zoo experiences, and tends to focus on demographic data including age, income and education (Falk, 2006). While demographic data can be useful for marketing purposes, they provide little insight into whether, how and why people learn when visiting a museum or zoo (Falk, 2006). Falk (2006) discussed the importance of visitor identity and the link between visitors’ entering motivations and their exiting learning. A visitor’s identity consists of the sum of their life experiences, prior knowledge, experiences within a particular setting, social and cultural aspects, expectations and interests (Falk, 2006; Pekarik, Doering & Karns, 1999; Swanagan, 2000; Vernon & Boyle, 2008; Wagner, 2002).

Early research typically focused on visitors’ primary motivation for their visit (Morgan & Hodgkinson, 1999) but later studies have shown that visitors arrive with multiple reasons or agendas (Falk, 2006; Vernon & Boyle, 2008). Falk’s (2006) research into visitor identity revealed that museum visitors had a tendency ‘to enact one or various combinations of five museum-specific identities’: explorers, facilitators, experience seekers, professional hobbyists or spiritual pilgrims (p. 151). As the relationship between visitor learning and visitor identity and agenda were being further revealed, zoos recognised the importance of this area of research by stating a desire to learn more about visitor identity as a tool to enhance education potential (Falk et al., 2007). Vernon and Boyle’s (2008) research expanded on Falk’s identity-related motivations and found
that most zoo visitors gave multiple identity-related reasons for their visit and, as such, suggested that zoos explore this further to ensure they offer “multiple layers of experiences to appeal to the broad array of visitor motivations” (Vernon & Boyle, 2008, p. 9). Further research continued to suggest that the provision of numerous communication types would appeal to a greater proportion of visitors, encouraging them to engage in free choice learning (De Herder & Streiter, 2010; Falk, 2006; Fraser and Sickler, 2008; Kola-Olusanya, 2005; Morgan & Hodgkinson, 1999; Packer & Ballantyne, 2010; Sommer, 1972). Communication diversity was actively encouraged within the World Zoo and Aquarium Conservation Strategy (WAZA, 2005), which stated that zoos are to provide a “range of experiences, materials and resources for the diversity of visitors” (p. 37).

**Zoos Communicating with Visitors**

In response, zoos have adopted a variety of communication strategies to convey their education messages. In addition to the traditional taxonomic species signs, colourful graphic interpretive signs adorn animal enclosures, keepers conduct feeding demonstrations and general talks about the animals in their care, and docents or volunteers converse with zoo visitors often providing an opportunity for visitors to touch artifacts (Anderson, 2003; Bashaw & Maple, 2001; Lindemann-Matthies & Kramer, 2005; Mony, Heinlich, 2008). Animal shows and theatre are utilised in zoos to entertain and educate general visitors and purpose built education or discovery zones are open to both general visitors for informal learning and school children participating in a formal program (Anderson, Kelling, Pressley-Keogh, Bloomsmith & Maple 2003; Heinrich & Birney, 1992). Zoos have also utilised technology as a means of communicating with their visitors in the form of televisions playing video loops, touch screens, soundscapes, web applications and distance learning via the Internet (Anderson, 2003; Carr & Cohen, 2011; Clay, Perdue, Gaalema, Dolins & Bloomsmith, 2011; Larsen, 2002; Perdue, Stoinski, & Maple, 2012; Smith & Broad, 2008; Wagner, 2002). This list is not exhaustive but does demonstrate that a variety of communication types is available to and used by many zoos.

Until recently however, there has been little research investigating the educational benefits of offering multiple layers of interpretation to zoo visitors (Weiler & Smith, 2009). Weiler and Smith (2009) concluded that, “no individual interpretive medium performed better in terms of any of the ten indicators of visitor cognitive, affective and
behavioural outcomes” (p. 102). Although they were unable to recommend one communication type over another, Weiler and Smith’s (2009) research supported the view that the more types of education communication provided to zoo visitors, the greater the impact on visitor learning. By comparison, measuring zoo visitor learning has been the focus of much research (see Adelman et al., 2000; Ballantyne, Packer, Hughes & Dierking, 2007; Bitgood, Patterson & Benefield, 1988; Dunlap & Kellert, 1989; Lindemann-Matthies & Kramer, 2005; Randler, Baumgartner, Eisele & Kienzle, 2007; Swanagan, 2000). Yet despite available research, zoos’ claims regarding their role as education providers remain largely unsubstantiated (Moss & Esson, 2013). Moss and Esson (2013) noted that “the burden of evidencing educational impact falls squarely on the shoulders of zoos” (p. 17).

Measuring Educational Success
One methodological approach to providing evidence of educational success is educational program evaluation. Program evaluation has been described, theorised and defined by a number of authors. Weiss (1998) characterises evaluation as “the systematic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy” (p. 4). Jacobson (1991) describes evaluation as the “collection, measurement, analysis and interpretation of data relevant to a program’s audience and environment” (p. 143), a measurement tool used to establish if the (zoo education) program achieved the predetermined objectives (Jacobson, 1991; Jacobson, McDuff & Monroe, 2006). Kleiman et al. (2000) state that evaluation should be used to assess success or failure, in relation to goal achievement, and to also determine the quality of performance and generate recommendations for program improvement.

The Edinburgh Zoo Workshop (2005) gave three reasons for evaluating zoo education: justification, verification and development. Jacobson (1991) and Norland and Somers (2006) stress the importance of evaluation being elastic, capable of evolving as new values or concepts are identified, and also that evaluation is more effective as a coordinated approach, a “collaborative adventure” (Norland & Somers, 2006, p. 10). Throughout the research available on evaluation, common themes can be found: the need to determine clear project objectives with measurable results, the need for consistent language, to provide definitions of all terms, and the need for a contextual understanding of the social, political and cultural aspects relevant to a particular

The World Zoo and Aquarium Conservation Strategy (WAZA, 2005) only briefly addresses the issue of educational program evaluation but considers the process an essential part of zoo education. According to the Edinburgh Zoo Workshop (2005), only one zoo, Bristol Zoo (United Kingdom) was known to conduct evaluation of their education programs. Within the document ‘Building a Future for Wildlife – The World Zoo and Aquarium Conservation Strategy’ (WAZA, 2005), WAZA recommended that all zoos produce a written education policy and strategic plan for education. The WAZA strategy document then lists the European Association of Zoos and Aquaria (EAZA) education standards which state “the zoo must demonstrate that it is carrying out its education policy, by reference to specific projects, attendance figures, evaluation procedures and research” (WAZA, 2005 p. 36). Further, WAZA (2005) “recommends that individual zoos and aquariums develop or adapt their own education policies in line with those of their association and their own needs” (p. 41) highlighting the importance of placing each zoo within its own context and social realm. WAZA (2005) also “strongly encourages (rather than recommends) all zoos and aquariums use objective and tested methods of evaluating the effectiveness of their conservation education and training programs” (p. 41). However, despite these recommendations and the potential value associated with education program evaluation, no research could be found relating to the systematic use of evaluation in zoos for either formal or informal education.

**Conceptual Shortcomings of Prior Research**

When considering the number of different concepts associated with education in zoos it is understandable that gaps within the existing body of literature exist. The focus of this research involves an investigation of the educational provision within zoos, the visitor experience and associated expectations and measures of success. Four key concepts were identified as shortcomings of prior research relating to these areas of investigation: enquiring why people visit the zoo, beyond primary motivations; the extent to which zoos’ priorities are consistent with community expectations; in what ways do modern zoos communicate education to their visitors; and the measures currently employed by zoos to determine their education success. Each of these concepts is discussed in terms of how they informed the development of this study.
Enquiring beyond primary motivations.

Early studies investigating the reason why people visit zoos had a tendency to focus on visitors’ primary motivation (Kellert, 1979; Morgan & Hodgkinson, 1999) and typically treated education and entertainment as mutually exclusive (Falk, Moussouri & Coulson, 1998). Morgan and Hodgkinson’s (1999) research concluded that zoos would benefit from “blending recreation with education in order to meet visitors’ needs” (p. 237). A review of the literature by Dierking et al. (2002) supported this notion identifying that entertainment and learning can co-exist and are not mutually exclusive motivations. Falk’s (2006) research into personal identity revealed that visitors may arrive with multiple reasons for their visit, rather than a single or primary motivation. Given the complexities associated with visitor motivation and personal identity, research limited to investigating visitors’ primary motivation for visiting a zoo may not provide a full indication of why a particular visitor chose to visit a zoo. As such it was identified that this research must enquire beyond a visitor’s main or primary reason for their zoo visit to more effectively establish if learning was part of their reason for visiting the zoo.

Zoos’ priorities and community expectations.

Zoos have evolved across time, managing an ever-increasing range of roles and responsibilities. Most recently, zoos have become actively engaged in conservation by participating in endangered species conservation programs and facilitating animal research both within and beyond zoo boundaries (Fraser & Wharton, 2007). Complementary to these conservation goals are educating school children and the general public about conservation issues; improving husbandry techniques and veterinary care for their captive populations; and refining mission statements to more closely align with community values. Fraser and Wharton (2007) raise the issue that while research often discusses the many roles and responsibilities of zoos (Bostock, 1993; Carr & Cohen, 2011; Jamieson, 1985; Mason, 2000), there is little research that measures community views; are zoos doing what their communities expect? The review of literature conducted by Dierking et al. (2002) also found a significant gap between what zoos believe they are designed to accomplish and what the public thinks, highlighting a need for comparative research that investigates the priority given to zoos’ roles and responsibilities from both the zoos’ and their visitors’ perspectives.
**Education in zoos.**

Within the literature, the issue of improving communication through understanding audience is a common theme (De Young, 1993; Jacobson, 1999; Knapp, 1972; Monroe, 2003). Dierking et al. (2002) noted a need for more research into how zoos can more effectively communicate their conservation-related messages to the public. Early research (Bitgood & Patterson, 1987; Broad & Weiler, 1998; Povey & Rios, 2002) focused on zoo exhibit stay times, with the view that the longer visitors spent at an exhibit the greater their learning opportunities through interpretive media and immersive experiences (Smith & Broad, 2008). Current research suggests that zoos benefit from having a variety of education communications to appeal to a wider audience (Weiler & Smith, 2009). However, while the literature discusses a variety of communication strategies that could be used to educate general visitors in zoos, there is little that tells us what strategies are actually being used in today’s zoos.

**Determining educational success.**

To gauge educational success, zoos are encouraged by governing associations to use educational program evaluation. For example, The World Zoo and Aquarium Conservation Strategy (WAZA, 2005) states that “it is essential that zoos and aquariums use a variety of methods to evaluate the impact of their education and training programs” (p. 40). The accreditation standards of the Association of Zoos and Aquariums (AZA) state that “exhibits, interpretive programs and other education programs should be evaluated on a regular basis for effectiveness and content” (AZA, 2014, p. 15). The European Association of Zoos and Aquaria (EAZA) education standards note that “via annual reports, the zoo must be able to demonstrate that it is carrying out its education policy, by reference to specific projects, figures of attendance, evaluation procedures and research” (EAZA, 2008, p. 2). The British and Irish Association of Zoos and Aquariums (BIAZA) are guided by the Secretary of State’s Standards of Modern Zoo Practice which state that “zoos should keep a record of their conservation and education activities and should be encouraged to evaluate the effectiveness of their contribution to these activities by collecting appropriate evidence and /or engaging in research projects to do this” (BIAZA, 2012, p. 15). Arguably the most comprehensive guidelines can be found within Canada’s Accredited Zoos and Aquariums (CAZA) policy specifications which note mandatory requirements for their members to evaluate their education programs in key areas including “specific program goals; pedagogical merit; conservation merit; defined target audiences; and formal evaluation” (CAZA, 2008, p.
Beyond these guidelines however, very little research was found relating to the actual use of measures or evaluation to determine educational success in zoos.

To date, these issues have not been adequately addressed in the existing body of literature on education and evaluation practices in zoos and zoo visitor motivations. This may in part be due to the methodological approaches adopted in prior research.

**Methodological Limitations of Prior Research**

In the research available on education and evaluation practices in zoos, three key methodological limitations were identified: context, scope and a preference for the use of quantitative methodologies.

**Context.**

Historically, zoos have been dependent on visitor research generated within museums. Visitor studies and education within the context of zoos are relatively new fields of investigation with the greater part of literature emerging since the 1980s (for example: Anderson, 2003; Bashaw & Maple, 2001; Churchman, 1985; Heinrich & Birney, 1992; Marshdoyle et al., 1982; Packer & Ballantyne, 2010; Smith & Broad, 2008; Vernon & Boyle, 2008; Wagner, 2002; Wineman, Piper & Maple, 1996) Even today, the majority of studies that focus on informal learning, free choice learning, visitor motivation and visitor identity are conducted within the context of museums. Zoos often rate a mention within these studies with authors suggesting that zoos and museums are comparable institutions (Alexander & Alexander, 2008; Martin & College, 2012; Mason, 2000). Zoos and museums are arguably similar in terms of having education potential and both offer exhibits to the public. However, Milan and Wourms’ (1992) research found that the “equivalencies presumed to exist between museum and zoo visitors” (p. 134) were questionable. They suggested that it was inequitable to apply findings accumulated within museum studies to the context of zoos because each site attracts different visitors (Milan & Wourms, 1999). Given the potential benefits associated with zoos providing effective education to their general visitors it is essential that zoos have a much greater understanding of their visitors’ needs, motivations and receptivity to conservation messages. As such, visitor studies conducted within the context of zoos have the potential to will provide zoos with a specific knowledge base for direct application.
Scope.
Examination of the literature derived from visitor and education research within the context of zoos revealed that most were limited in scope by the number of sites or institutions that participated. Most typically only a single site was used and although a few studies have been conducted across multiple sites (for example Anderson, 2003, two zoos; Fraser, Bicknell, Sickler & Taylor, 2009, three zoos; O’Connor, 2010, thirty zoos and aquariums; Vernon & Boyle, 2008, twelve aquariums), they were in the same country or immediate region, rarely crossing cultural or social boundaries with the noted exception of Wineman et al., 1996, where 100 zoos were surveyed across 22 countries. Many of these studies were also found to focus on a single conservation issue rather than the zoo visit as a whole. Dierking et al. (2002) conducted an extensive literature review and one of their conclusions was to identify a need for multi-site studies, which would provide a broader perspective and draw conclusions that were applicable to a number of zoo contexts rather than a single site.

Methodology.
The literature also revealed that researchers exploring zoo education predominantly used quantitative methodologies (Gutierrez de White & Jacobson, 1994; Kellert, 1979; Marshdoyle et al. 1982; Swanagan, 2000) with only a few utilising a qualitative approach (Patrick et al., 2007; Pringle, Hakverdi, Cronin-Jones & Johnson, 2003). A small number of researchers were found to use mixed methods such as Vernon and Boyle (2008), White and Marcellini (1986) and Wineman et al., (1996) who presented data collected through quantitative surveys enriched by data collected in face-to-face interviews and further supported by either focus group discussions or personal meaning mapping. These mixed methods studies produced data rich reports that benefited from both quantitative and qualitative data collection methods. However, they were limited in scope by being conducted either within a single site (White & Marcellini, 1986; Wineman et al., 1996) or multiple sites, within the same region (Vernon & Boyle, 2008).

The limited understanding of zoo visitor motivation and education in zoos, coupled with the conceptual and methodological limitations discussed above, informed the design of the current research grounded in a context specific, multi-site, global perspective. The next chapter presents an overview of the methodology used for this research project.
Chapter 3. Methodological Overview

Methodological Framework

The complexities associated with studying a social phenomenon such as zoo education, coupled with a pragmatic philosophy, led to the use of a mixed methods approach in this research. The use of both quantitative and qualitative data collection methods within the same research project is not a new concept. Within the last two decades, however, the approach has become increasingly popular in studying social phenomena because it draws on the benefits of both quantitative and qualitative methods and is consistent with a pragmatic orientation to inquiry (Creswell, 2003; Greene, 2007; Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Leech, 2005; Tashakkori & Creswell, 2007).

The early utilisation of more than one research method can be found within the work of cultural anthropologists, particularly fieldwork sociologists such as Jahoda, Lazarsfeld and Zeisl (1931/2003), during the first half of the 20th century, though it was not recognised as mixed methods at that time (Johnson, Onwuegbuzie & Turner, 2007). Following that period, the emergence of logical positivism led to studies within social and psychological fields being predominantly quantitative (Johnson et al., 2007). Although qualitative methods were also being developed during this time, quantitative studies dominated these fields (Johnson et al., 2007). In 1959, Campbell and Friske discussed the use of matrices to demonstrate how the use of multiple independent research methods could provide validation of data through convergence. In turn, this concept was extended by Webb, Campbell, Schwartz and Sechrest (1966) who first introduced the term triangulation and suggested that uncertainty of interpretation would be greatly reduced if a proposition could be confirmed by two or more independent measures (Johnson et al., 2007).

Denzin (1978) and Patton (1990) have since both identified the combination of quantitative and qualitative methods as fundamental to the notion of triangulation; the process of testing consistency and corroborating findings through the use of different data gathering methods. This view was extended by Johnson and Onwuegbuzie (2004) and Tashakkori and Teddlie (1998) who suggest that using a mixed methods approach can work to address any potential weaknesses that may be inherent in a single method and provides an opportunity to test the consistency of research findings. Greene,
Caracelli and Graham (1989) also argue that mixed methods enable expansion and elaboration, provide added depth, richness and detail to a study and can potentially uncover new insights into participant experiences. McConney, Rudd, and Ayers (2002) have noted the increasing trend among researchers to using whatever type of data or method best answer research questions, a dialectically pragmatic philosophy.

Dialectical pragmatism offered a philosophical middle ground along the so-called methodological research continuum that is based on practical, outcome-oriented methods of investigation (Alexander, 2006; Johnson & Onwuegbuzie, 2004; Morgan, 2014). Rejecting the either/or debate between constructivism and positivism (Teddlie & Tashakkori, 2009), the pragmatic researcher focuses on what works in the real world (Johnson & Christensen, 2004). When constructing the research framework for this project, priority was given to selecting the best methodological mix for answering the research questions, sliding along the proverbial continuum as required. This approach seemed most appropriate in response to suggestions that adopting a pragmatic or pluralist position not only helps to improve the quality of research but also facilitates communication and collaboration between social scientists operating at all points along the continuum, due to their understanding of both qualitative and quantitative research (Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Leech, 2005), thus potentially expanding receptivity of the research by different audiences associated with zoo education.

Research Design

The impetus to investigate zoo education and the visitor experience occurred while attending the Asian Zoo Educators Conference at Singapore Zoo in 2007. As an observer of proceedings and through conversations with zoo educators it became evident that educators could benefit from sharing knowledge about how zoos design, implement and evaluate their formal and informal education provision. It was also identified that there was a need to examine what zoo visitors experience during their informal visit and the extent to which that experience is consistent with zoos’ desired informal education experience. The aims of the research included gaining insight into current education and evaluation practices in zoos and to considering visitors’ perspectives relating to zoos as educational institutions. The research involved development of an online questionnaire (Phase 1), suitable for dissemination to zoos across the globe to survey a relatively large number of zoos within a reasonable period.
The empirical data acquired from the questionnaire was then enhanced with data collected from nine case study zoos (Phase 2). Case study research facilitated direct observation and documentation in each site and enabled the zoos to be examined within their own context while also providing the opportunity for face-to-face interviews with zoo education staff and zoo visitors.

**Participants**

*Phase 1: online questionnaire.*

Participants were derived from a contact list of zoos obtained from the International Zoo Yearbook (ZSL, 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. Non-probability convenience and snowball sampling were used recruit participants. As a result, it should be noted that results from this research are limited in their generalisability to all zoos in all contexts.

In keeping with the first aim (*To study zoo education from both zoos’ and zoo visitors’ perspectives on a truly global basis, beyond the boundaries of zoo accreditation, across numerous social, cultural and economic fields*) to provide a point of comparison that maintained the global span (and spirit) of the study, zoos were separated into one of three geographical regions (Figure 3.1).

It is readily acknowledged that each region represents a vast diversity of zoos and cultures. Each region spans both developed and developing counties and consequently the three regions are in many senses artificial. However, the “constructed” regions were in fact quite useful from a logistical and research planning standpoint, as well as allowing comparisons to be drawn with caution.

A total of 191 zoos (32%) in the database participated and completed the online questionnaire. It should also be noted that 9% of emails were returned as non-deliverable (54 zoos, primarily in India, Japan and Germany). Table 3.1 provides a summary of Phase 1 participation.
Key:
- Green: Participating
- Light Green: Not Participating
- Black: No Zoo Listed

Figure 3.1: Region 1 Asia-Pacific, Region 2 Europe, Middle East and Africa, Region 3 North and South America.

Table 3.1: Summary of invitations sent, responses received and rates of participation, by geographical region.

<table>
<thead>
<tr>
<th>Region</th>
<th>Invitations Sent</th>
<th>Responses</th>
<th>Response Percentage</th>
<th>Countries in Region with Zoos</th>
<th>Countries that Responded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asia-Pacific</td>
<td>96</td>
<td>26</td>
<td>27%</td>
<td>16</td>
<td>10 (63%)</td>
</tr>
<tr>
<td>2. Europe, Middle East and Africa</td>
<td>327</td>
<td>115</td>
<td>35%</td>
<td>43</td>
<td>35 (81%)</td>
</tr>
<tr>
<td>3. North and South America</td>
<td>170</td>
<td>50</td>
<td>29%</td>
<td>13</td>
<td>7 (54%)</td>
</tr>
<tr>
<td>Totals</td>
<td>593</td>
<td>191</td>
<td>32%*</td>
<td>72</td>
<td>52 (72%)*</td>
</tr>
</tbody>
</table>

Note (*): Response percentage was 191 of 593 zoos or 32%. Countries represented were 52 of 72 countries or 72%.
Phase 2: case studies.

Case study sites were selected from Phase 1 participants using non-probability purposive sampling. Zoos participating in the online questionnaire were asked to express their interest in participating as a case study site. As completed questionnaires were received during Phase 1, zoos’ responses were noted and case study recruitment began. In total, more than 75% of participating zoos expressed their interest to participate as a case study site. During the planning phase of the research three case study sites, one from each region, were proposed. However, the response rate to the online questionnaire and zoos’ willingness to participate in case study research led to the number of cases being increased to nine. Initially it was thought that three case study sites from each region would best represent responding zoos. However, given the high number of zoos responding within Region 2 and the relatively low number within Region 1, 2 sites were selected from Region 1, 4 from Region 2 and 3 from Region 3, providing a total of 9 case study sites (Chapultepec Zoo, Colchester Zoo, Columbus Zoo and Aquarium, Johannesburg Zoo, Loro Parque, Moscow Zoo, Taronga Zoo, Toronto Zoo and Zoo Negara). Ultimately, the nine zoos visited as case study sites included: 6 sites that have English as their primary language (a translator was provided by each zoo for the remaining three); 8 sites with visitation in excess of 1,000,000 per annum; 3 sites that are private and six that are government-funded; 3 sites among the 10 largest zoos in the world including both the zoo with the highest visitation and the largest zoo in the world (based on land area and the size of the animal collection).

Zoo staff interview participants.

Case study zoos were required to allow their head of education to be interviewed during the case study data collection period. Zoos were also requested to allow education area coordinators, especially volunteer co-coordinators, interpretive staff and general educators to be interviewed. Even though it was at the discretion of each case study site, all sites provided a zoo staff member for each area of education within their zoo. Twenty-eight staff members were interviewed across the nine case study sites. In all cases, the head of education was interviewed and at two sites the zoo directors were also interviewed. The remaining interviewees included area co-coordinators (such as volunteer, school and curriculum) and general educators – typically this accounted for all education staff in each case study site.
Zoo visitor interview participants. Visitors were recruited deep within each zoo maximising the likelihood that the respondents had seen at least some of the exhibits prior to being interviewed. Focal sampling, with a continual ask, was employed to interview visitors over 18 years of age. The participation rate was very high, above 80%. Sixty general zoo visitors were interviewed at each of the nine case study sites resulting in a total of 540 interviews.

Instruments

Online questionnaire. The questions in the online questionnaire were derived from an extensive literature review and identification of information thought necessary to most effectively answer the research questions and achieve the research aims. The questionnaire was developed into an electronic format, accessible via a web-link. Due to the global nature of the research and the unknown level of interest or willingness to participate a pilot study was conducted to detect any methodological problems and provide the opportunity to adjust the procedure prior to the full-scale study (Fraenkel & Wallen, 2003).

A random sample of 30 zoos (representing 24 countries) was selected from the database of 593 zoos. These zoos were sent an email inviting them to participate in the research project and within that invitation, the web-link to the questionnaire. Respondents were asked to complete the questionnaire online and all visits to the web-link were logged, including incomplete responses. Of the 30 zoos that were invited to participate, five responses were received. Of those responses, three zoos stopped answering questions half way through the questionnaire and the remaining two completed the majority of questions. It should also be noted that four of the remaining 25 emails were returned as non-deliverable. In view of the overall response rate and respondent comments regarding the length of time (one hour) required to complete the questionnaire, the questionnaire was redesigned reducing the anticipated completion time to about 30 minutes while maintaining a mix of both quantitative and qualitative questions.

The final online questionnaire (Appendix 5) was organised in three sections that included (1) general zoo information, activities and mission statement; (2) types of education provision and their development, implementation and evaluation; and (3) zoo visitors and their perceived educational needs and priorities. The questionnaire consisted of 62 questions, including 20 open-ended (e.g., Question 16. Why do people
come to your zoo? Or, in your view what attracts visitors to your zoo?), 29 closed response items (e.g., Question 50. Does your zoo collect information from teachers or students after they have visited your zoo?), 14 rating scale (e.g., Questions 6. Please rate the priority of captive breeding in your zoo: very low priority, low priority, average priority, high priority, very high priority) and 4 multiple choice items (e.g., Question 33. How are those objectives created and defined? General discussion; Given as a directive; Linked to mission statement; Linked to school curriculum; Other). Within the questionnaire some closed response items also provided an open-ended option.

**Case studies.**

A case study is an empirical inquiry that investigates individual cases over an extended period of time, within their own natural environment, or context, and provides a detailed account and analysis of the phenomenon being examined (Johnson & Christensen, 2004; Sarantakos, 1998; Stake, 1978). According to Johnson and Christensen (2004, p. 376) and Sarantakos (1998), case study research explores the whole unit and not just aspects within that unit. Case study research within this project provided the opportunity to utilise several methods of data collection. These included: observations guided by a predetermined checklist supported by an extensive photographic record; interviews with both zoo education staff and zoo visitors, voice recorded for respondent convenience and research accuracy; and analysis of documents including education material and annual reports all used collectively to increase the value of the research (Creswell, 2003).

The questions developed for case study zoo staff interviews (Appendix 6) were designed as an extension of the online questionnaire and constructed in an open format for the purpose of clarifying data and obtaining extended answers. For example, in the online questionnaire the section titled “Education in your Zoo” explored the types of education materials and communication used by zoos to educate their visitors. Question 5 in the zoo staff interview extended the focus of this topic with the purpose of clarifying data obtained from the online questionnaire. Zoo staff members were asked “what mediums does your zoo use to educate the general visitors?” Together, the two data sets provide a detailed account of the types of education materials and communication used by participating zoos.
The zoo staff interview protocol consisted of 18 questions requiring between thirty minutes and one hour to complete depending on the respondents’ level of response detail. Interviews were conducted privately and all interviews were overtly voice recorded with each participant’s permission.

The questions developed for visitor interviews (Appendix 7) were designed to provide insight into visitors’ motivations, experiences and views on zoo activities. Questions included pre visit information such as why they came to the zoo; participation in activities within the zoo; the importance of zoos’ roles and responsibilities; behaviour relating to animal visibility and their subsequent engagement with exhibit signage; their educational needs and preferred method of delivery; and their visit’s highlight. Each zoo visitor interview took approximately five minutes.

Data Collection Procedures and Analysis

Phase 1 procedure: online questionnaire.

Recruitment to participate in the online questionnaire involved database email contact, snowball sampling and contact through various zoo education associations around the world.

Each zoo contact in the database was sent an email inviting participation in the research project (Appendix 1). Within that initial email, zoos were provided with a brief outline of the research project (Appendix 2), details regarding their participation and all necessary contact details. A web-link to the questionnaire, which could be accessed and read without the need to complete any questions, was provided. A more extensive project outline and information regarding participation as a case study site were included as attachments (Appendix 3).

In addition to emailing zoos in the database, several zoo educators were contacted directly by email or telephone and invited to participate in the study. Within their invitation to participate, addressees were also asked to forward the information on to other zoo educators to initiate snowball sampling. Through their participation and support, details of the research project were printed in the International Zoo Educators (IZE) Newsletter (April 2011) stating the IZE’s support of the research (Appendix 4). All international zoo associations were also contacted and asked to assist with recruitment resulting in the Canadian Association of Zoos and Aquariums and the Pan
African Association of Zoos and Aquariums emailing their members requesting their participation. The European Association of Zoos and Aquariums also offered their support of the research and provided a mailing list of their members.

During recruitment, the online questionnaire was monitored daily for completed questionnaires and participating zoos were sent an email of appreciation and encouraged to forward details of the research to other zoos that met the research criteria (zoos or zoos with aquariums that were open to the general public). Also, during the first week of each recruitment month, duplicate email invitations were sent to zoos that had not yet participated. If emails were returned as ‘non-deliverable’ alternative avenues were attempted including contact via a zoo’s website or sending the invitation to the zoo as a facsimile. In total, recruitment spanned seven months and it should be noted that the vast majority of respondents (95%) to the online questionnaire were those contacted by email using the database provided by the International Zoo Yearbook (ZSL, 2009). Of those respondents 52% were education staff, 18% directors or curators, 5% veterinary, keeper or senior staff and the remaining 25% did not specify their position.

Data for the online questionnaire were collected electronically in a format suitable for direct transfer to Microsoft Excel reducing the chance of transcription errors. Quantitative data were analysed using MS Excel, enabling statistical and graphical comparisons to be made. The qualitative data, also organised in MS Excel, were analysed by first manually coding each response according to its individual characteristics. Using the various codes, the data were then organised into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorised and grouped in themes and no new concepts or themes were evident.

**Phase 2 procedure: case studies.**

Each case study visit was limited to seven days. The data collection process involved an extensive site analysis, guided by a predetermined list, to place each zoo within its own context. Data collection methods included contextual observation supported by an extensive photographic and ethnographic record, document analysis, visitor interviews, education staff interviews and observation of and participation in special tours, shows and demonstrations.
Data collection was organised in consideration of two critical aspects:

1) Acknowledgement and reduction of potential bias inherent in observational studies: This was achieved by minimal contact with zoo staff upon arrival at the case study site. The zoo contact was informed, prior to arrival, that it was essential to observe the zoo without any guidance or suggested observations. Only a brief meet and greet was permitted to facilitate access to the zoo and to arrange a time at the end of the day to meet more extensively. It should also be noted that all case study zoos were viewed for the first time during the data collection period.

2) Data that could only be obtained while at the site was collected as a priority, to allow for any unforeseen interruptions or delays. This included contextual observations, visitor interviews and participation in or observation of any tours, shows and demonstrations. If necessary, staff interviews could be conducted via telephone. It should be noted however, that all case study data were collected on site during the data collection period.

Collection and analysis of data at case study sites involved a number of different methods. Contextual data were documented and supported by an extensive photographic record. Observations of verbal presentations conducted in zoos (keeper talks, animal shows, or any other talks) were documented and experienced at least twice to improve the quality of observations. An ethnographic journal was also maintained throughout the data collection period, to provide an additional point of reference.

Interviews with both zoo staff and zoo visitors were overtly recorded with the respondent’s permission. All interviews taken during the day were transcribed that evening to ensure adequate data collection. This provided the opportunity to re-interview staff members or additional visitors if responses were inaudible or there was a technical issue. It should be noted however, that only original interviews were used and it was not necessary to conduct any additional interviews.

Documents available to general visitors including zoo maps and brochures were collected upon arrival and retained. Each case study zoo provided general zoo documents, including annual reports and special zoo publications as well as samples of education materials including worksheets and program briefs and copies of evaluation measures.
Qualitative and quantitative data derived from case studies were analysed using the same process as noted above in Phase 1.

**Research Limitations**

The research presented within this project is not intended to represent all zoos. It is intended to provide insight into current education and evaluation practices across a non-probabilistic sample of zoos. Below is a list of research limitations and also procedures used to minimise the impact of those limitations.

**Phase 1 Questionnaire: population and sample.**

The accessible population of zoos was delimiting by the contact list used to generate the research database. The list was unverified and it is possible that not all zoos were noted on the contact list and not all email addresses were current. As a result, a proportion of zoos may not have been successfully contacted. Also, the individual completing the online questionnaire was at the email recipient’s discretion and could not be controlled. Limitations resulting from the nature of the accessible population were minimised by using a number of contact approaches beyond the database email addresses, as noted above. To guide the questionnaire to the target respondent, all email invitations were sent to education departments in zoos, education personnel or the zoo’s director to improve the possibility of the most appropriate person completing the questionnaire.

**Phase 1 Questionnaire: instrument design.**

The accessibility of the online questionnaire was limited by being available in English only. Also, varying interpretation may have occurred as a result of question wording or presentation. Limitations as a result of instrument design were minimised by use of a pilot study to pre-test the questionnaire and results from that study informed a revised questionnaire.

**Phase 2 Case studies: sample.**

The case study sample selection process and the number of case study sites limit the generalisability of results to all zoos in all contexts. Also, the duration of each site visit restricted the number of possible visitor interviews, which also limits the generalisability of results to all zoo visitors. Each case study site selected staff members to be interviewed which could be considered a limitation. However, it should be noted
that in all cases zoos provided a zoo staff member for each area of education within their zoo, including the head of education.

**Phase 2 Case studies: instrument design and procedure.**

Several limitations were identified within the case study data collection process and minimised where possible. The limitations associated with a single observer were minimised by using predetermined checklists to guide observation and collection of contextual data. When interpreters were used (3 case study sites where English was not the first language), specific guidelines were given to ensure that visitors’ whole answers were translated into English. However, incomplete translation of visitor answers, or interpreter bias towards a particular response set, may still exist in the data gathered at case study sites.

Zoos were requested to allow their head of education and education area coordinators to be interviewed; as such it was possible that zoos’ selection of staff members for participation introduced bias. It should be noted however, that all zoo staff responsible for all forms of education in the zoo were interviewed at each case study site.

The intention of the research was to gather a rich mix of qualitative and quantitative data that together afforded a deep insight into zoo education and the visitor experience. The limitations discussed reduce the generalisability of findings to all zoos or zoo visitors. However, all zoos in all contexts may find some value within the findings that could benefit their own education and evaluation processes and provide insight into the visitor experience.

The next chapter presents the empirical research generated by this project. The chapter begins with a synopsis of the key concepts studied and how they relate to each other and zoo education. Four manuscripts are then presented.
Chapter 4. The Empirical Research

This research project investigates education within the context of zoos on a global scale specifically focusing on current educational priorities and provision, communication strategies, measures of success and the visitor experience. Each of these concepts play a key role in this research and are presented as a set of four mixed methods, empirical studies. A brief overview introduces each study highlighting links to the other papers and the overall research aims. Figure 4.1 depicts the interrelationships between the abovementioned concepts, highlighting the focus of each empirical manuscript.

Figure 4.1. The relationship between concepts associated with zoo education that forms the focus of this research project.
As previously discussed, there are many different facets associated with zoo education and each potentially played an important role in understanding education provision in zoos. There were external factors such as community expectations, zoo visitor motivations and learning agendas and internal factors such as zoos’ communication strategies with their visitors, formal and informal education program development and evaluation practices. Given these considerations improving our understanding of what intentions visitors bring with them when they visit zoos was the initial focus of the project and are investigated in the first study ‘Do zoo visitors come to learn? An internationally comparative, mixed methods study’.

Study two ‘The role of zoos in modern society – a comparison of zoos’ reported priorities and what visitors believe they should be’ then investigates how education fits within zoos’ roles and responsibilities from the perspectives of zoos and zoo visitors.

The next study ‘How do zoos ‘talk’ to their visitors? Do visitors ‘listen’? A mixed methods investigation of the communication between modern zoos and their general visitors’ uses data from the online questionnaire and case study sites to examine how zoos communicate with their visitors and to what extent visitors engage with exhibit signage, the traditional and most prevalent communication tool used by zoos.

The final study ‘Using evaluation to prove or to improve? An international, mixed method investigation into zoos’ formal education’ explores evaluation within zoos, examining how zoo staff conceptualise evaluation and current evaluation practices.
Study 1: *Do zoo visitors come to learn? An internationally comparative, mixed methods study.*

Study one investigates visitors’ motivations for visiting zoos, specifically enquiring beyond their primary motivation and focusing on their learning agendas. Milan and Boyle (2008), it was important to determine how learning featured in their zoo visit expectations. Within the study, zoos were also asked what they believed their visitors’ Wourms (1992) identified the need for context specific visitor studies in zoos and given that zoo visitors were found to arrive at zoos with a more sophisticated knowledge of animals and typically had multiple reasons for their visit (Falk et al., 2007; Vernon & learning needs were and how they made that determination. Zoos’ responses were compared to those of their visitors providing insight into the dependability of the measures used by zoos to determine visitors’ learning needs.
Do zoo visitors come to learn? An internationally comparative, mixed-methods study

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(Received 23 September 2013; accepted 13 June 2014)

Zoo visitors go to see animals, but are they there to learn? This mixed-methods study examines visitor learning from both zoos’ and visitors’ perspectives using qualitative and quantitative data. Five hundred and forty zoo visitor interviews from nine case studies provide insight into visitor intentions, which indicate that the majority of visitors (72%) arrive at zoos with a learning agenda. Over 170 zoos across 48 countries also report, via an online questionnaire, that the majority of their visitors come to learn. In contrast, however, 28 face-to-face zoo education staff interviewed at the nine case study sites suggest a different conclusion. The study also indicates that zoos appear to determine visitors’ intentions through a number of methods, but are most heavily reliant on informal measures with only 15% of zoos using both formal and informal processes. Juxtaposing these findings suggests that zoos’ reliance on informal measures of visitor intentions appears to provide them with a less than accurate picture of their visitors' learning agendas.

Keywords: free choice learning; informal education; visitor agenda; visitor motivation; zoo education

Introduction

The reasons why people visit zoos and museums have been well studied, (see Dierking et al. 2002; Falk 2006; Falk et al. 2007; Kellert 1979; Kohl 2004; Morgan and Hodgkinson 1999; O’Connor 2010; Peart 1993; Vernon and Boyle 2008) and learning about animals is one of those reasons. In the 1980s, some held the view that a zoo visit was a complete learning experience (Case 1980) yet Laetsch et al. (1980) reported that only a third of zoo visitors specified learning as their primary reason or motivation for visiting the zoo. Later research supported this finding, noting that people visited zoos for family enjoyment and to see animals with few respondents citing learning as a primary reason for their visit (Dierking et al. 2002). The same review of existing research also found that many visitors left the zoo with a sense of helplessness, unsure of what actions they could take to contribute to conservation (Dierking et al. 2002). Thus, there appears to be a paradox, few visitors cite learning as a primary motivation, yet upon leaving many visitors feel helpless because they are unable to solve problems they have learnt about during their visit. Perhaps this is due to visitors’ perceptions of learning. Visitors cite seeing animals as a motivation for their visit but may not consider this a learning activity. Or perhaps previous

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findings, which focus on visitors’ primary motivation, have missed additional, less
dominant motivations or agendas for visiting zoos including a desire to learn.

The importance of visitors learning and achieving the potential of zoos as educa-
tional institutions is increasingly important. In this modern, progressive and heavily
industrialised world with soaring extinction rates estimated between 100 and 1000
times higher than the long-term average (Nakamura et al. 2013) and rapid deforesta-
tion (Hancock 2001), understanding and reducing our environmental impact has
reached a critical point and as a community we need to maximise every environmen-
tal education resource we have available (Hungerford and Volk 1990; Patrick et al.
2007).

There has been much written about zoos’ ability to educate general visi-
tors (e.g. Bramley 1989; Case 1980; Churchman 1984; Dierking et al. 2002;
Marshdoyle, Bowman, and Mullins 1982; Moss and Esseon 2013; Packer and
Ballantyne 2010; WAZA 2005). In the 1970s, the ‘mere presence of animals in
enclosures was regarded as educational’ (Sommer 1972, 26). Bostock (1993) sup-
ports this notion writing that viewing a live, active animal is indeed an advantage
when learning about them, a sentiment further supported by Pearson, Dorrian, and
Litchfield (2013). Additionally, the observation of living things, their appearance,
size, colour and movement is an accepted study skill (Groundwater-Smith, Ewing,
and Le Cornu 2003). Thus, although it may be difficult to determine if visitors
who simply glance at an animal as they walk past an enclosure are engaged in
learning, it can be argued that visitors who stop with the purpose of observing
how an animal looks, moves and acts in real life are essentially engaged in free
choice learning. It is at this moment that zoos need to provide their key messages
to visitors, capitalise on visitor engagement and further enhance their free choice
learning experience.

Most typically, the type of education provided for general zoo visitors is infor-
mal; pedagogic communication not guided by an explicit curriculum and generally
offered by a zoo, to a visitor, in the form of species information and interpretive
signage (Anderson, Lucas, and Ginas 2003; Edinburgh Zoo Workshop 2005). The
learner, or zoo visitor, then has the opportunity to engage in free choice learning.
Free choice learning describes the process an individual experiences when their own
unique curiosity and interests guide their learning (Falk 2005). Informal education,
including interpretation, reflects the zoo’s perspective, capable of influencing
learning and free choice learning reflects the zoo visitor’s perspective, determining
the level and type of learning within a given context (Falk 2005; Kola-Olusanya
2005).

The context of a zoo visitor’s learning experience will be influenced by many
factors including the visitor’s agenda (their reasons for choosing to visit the zoo),
their personal identity, the setting, the message given, language used within the
message and audience composition or group dynamics (Bott, Castrill, and Myers
2003; Brisen-Garzon, Anderson, and Anderson 2007; Corcoran and Sievers 1994;
Hungerford and Volk 1990; Jacobson 1999; Kellert 2005; Monroe 2003;
Woods-McConney and McConney 1995). It has been suggested that there is a strong
association between learning and the learner’s physical, social and personal contexts,
including motivation (Anderson et al. 2003; Ceci and Rouazzo 1992; Falk and
Dierking 1992; Packer and Ballantyne 2010).

Historically, visitor motivation research is dominated by museum experiences,
rather than zoo experiences, and oriented towards the collection of demographic
data including age, income and education (Falk 2006). Falk (2006) contended that these types of data provide little insight into whether, how and why people learn when visiting a museum (or zoo) and discusses the importance of visitor identity. A visitor’s identity, or personal context, consists of the sum of their life experiences, prior knowledge, experiences within a particular setting, social and cultural aspects, expectations and interests (Falk 2006; Pekarik, Doering, and Karas 1999; Swanson 2006; Vernon and Boyle 2008; Wagner 2002). Early research identified visitors’ primary motivation for their visit (Morgan and Hodgkinson 1999) but later studies have shown that visitors arrive with multiple reasons or agendas (Falk 2006; Vernon and Boyle 2008). Doering and Pekarik (1996) noted that visitors are not ‘blank slates on which we write’ (20) rather, visitors arrive with an ‘entrance narrative’ (20), a predetermined agenda and an individual identity, which will influence their learning experience. This is supported by Falk’s (2006) research, which identified a link between visitors’ entering motivations and their exiting learning.

Visitor identity and agenda are therefore increasingly recognised as important for zoos to understand. For example, the Association of Zoos and Aquariums (2007) acknowledged the importance of this area of research by stating a desire to learn more about visitor identity as a tool to enhance educational potential. Studies have shown that today’s visitors arrive at a zoo with a more sophisticated knowledge of animals and the environment than that expected by the AZA Conservation Education Committee (Falk et al. 2007; Vernon and Boyle 2008). Falk (2005) contended that many zoo visitors already have an understanding of conservation problems and zoos could be more effective by offering visitors ‘simple, practical and concrete steps they could take to make a difference’ (276). These considerations highlight the importance of understanding the underlying interests and motivations of zoo visitors, and also zoo educators’ perceptions of visitor learning as a means of refining informal education and interpretation to enhance general visitors’ free choice learning. Thus, learning may not always be a visitor’s primary motivation for visiting a zoo but in modern times, what proportion of zoo visitors report learning as part of their visit agenda? How consistent are visitors’ responses about their learning intentions with the educational intentions of zoos?

To provide empirical answers to these questions, this study examines zoo staff perceptions of general visitor learning as reported by over 170 zoos across 48 countries. This research also compares zoo staff perceptions of visitor learning agendas to those of 540 zoo visitors from nine case study zoos, providing a broad understanding of visitor learning intentions on a global scale. To examine the modern perception of people visiting zoos to learn, from both the zoos’ and visitors’ perspectives, three research questions are posed in this study:

1. Do zoos believe that visitors have a hope or expectation of learning something when they visit the zoo and how does that compare to visitors’ responses?
2. What do zoos report their general visitors want to learn and how is that determination made?
3. What do visitors want to learn during their zoo visits and how does that compare to what zoos’ believe their visitors want to learn?
Method

The research questions examined within this paper, which focus on the perceptions of visitors’ learning during their zoo visit, have been derived within the context of a larger empirical study into zoo education and the processes modern zoos use to understand and improve their educational provision.

Studying zoo education on a global scale involved an appreciation that each zoo would have different perspectives, objectives, contexts and education implementation processes. To provide the desired accuracy, reliability and depth within the data, a mixed-methods research approach was utilised. The use of both quantitative and qualitative data collection methods can help to offset any weaknesses or limitations associated with particular single-method approaches. Denzin (1971) and Patton (1990) have both identified the combination of quantitative and qualitative methods as fundamental in the process of triangulation; the process of testing consistency and corroborating findings through the use of different data gathering methods. This view was extended by Johnson and Onwuegbuzie (2004) and Tashakkori and Teddlie (1998) who suggest that using mixed-methods approaches can work to address any potential weaknesses that may be inherent in a single method and provides an opportunity to test the consistency of research findings. Greene, Caracelli, and Graham (1989) also argue that mixed methods enable expansion and elaboration, provide added depth, richness and detail to a study and uncover new insights into participant experiences, and McConney, Rudd, and Ayres (2002) have noted the increasing trend among researchers and evaluators to using whatever type of data or method best answer research questions.

Data collection for the empirical study was divided into two phases. The first centred on an online questionnaire administered to zoos around the world to survey a relatively large number of zoos within a reasonable period. The second involved nine in-depth zoo case studies, facilitating direct observation and documentation within each site. Case study research enabled each zoo to be examined within its own context whilst also providing the opportunity for face-to-face interviews with zoo education staff and visitors.

Phase 1: online questionnaire

The online questionnaire was designed to facilitate broad-based description of how modern zoos design, implement and evaluate the formal and informal education experiences they provide. The online questionnaire consisted of 62 questions, including 20 open-ended, 29 closed response, 14 rating scale and 4 multiple choice items. The questionnaire was organised in three sections that included (1) general zoo information, activities and mission statement; (2) types of education provisions and their development, implementation and evaluation; and (3) zoo visitors and their perceived educational needs and priorities. The section of the questionnaire used for this paper focused on zoo visitors and their perceived educational needs. Zoo respondents were asked whether or not their visitors came to learn, only ‘yes’ or ‘no’ options were provided. Two considerations need to be acknowledged regarding this question: (1) the term ‘learn’ was not defined within the questionnaire and was open to zoo respondent interpretation; and (2) the closed format of the question. Zoos responding with the affirmative were then asked to rate how important their visitors considered learning about five topics (animal biology and ecology; the
conservation status of animals; the role of humans in environmental problems; what visitors can do to help save the animals and learning about what the zoo is doing to help save the animals) using a three point priority scale (least important, average importance and very important). An open item was also included to enable zoo respondents to identify any other topics their visitors came to their zoo to learn about. The questionnaire, written in English, was developed and administered in electronic format enabling zoos from all over the world to access the questionnaire via an Australian university web link. The online questionnaire also facilitated data collection in a format suitable for analysis without the need to manually enter responses into a spreadsheet and thus avoided potential data entry errors.

Recruitment to participate in the online questionnaire involved direct email contact and contact through various zoo education associations around the world. The contact list of zoos was obtained from the International Zoo Yearbook (ZSL, 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. A total of 172 zoos (29%) from 593 zoos in the International Zoo Yearbook (2009) participated in the study. It was not, however, possible to confirm that all email addresses provided in the 2009 Yearbook were correct and it is possible that a number of the 593 zoos were not actually contacted. This is particularly so for zoos in India, Japan and Germany from where 54 (9%) email invitations were returned as undeliverable. For this reason, and to help ensure that invitations were directed to zoo staff in a position to respond, snowball sampling was also used to contact as many zoos as possible. Nevertheless, the vast majority of respondents (95%) to the online survey were those contacted by email using the database provided by the International Zoo Yearbook (2009).

Several zoo educators were contacted directly by email or telephone and invited to participate in the study, to initiate snowball sampling. Through their participation and support, details of the research project were printed in the International Zoo Educators Newsletter (April 2011) stating the IZE’s support of the research. All international zoo associations were also contacted resulting in the Canadian Association of Zoos and Aquariums and the Pan African Association of Zoos and Aquariums emailing their members requesting their participation. The European Association of Zoos and Aquariums also offered their support of the research and provided a mailing list of their members.

Zoo recruitment spanned seven months (December 2010–June 2011). The majority of respondents were educational staff. Table 1 provides a summary of respondents’ positions and Table 2 provides a summary of zoo participation.

**Phase 2: case studies**

The selection of the case study sites was determined using the following process. All zoos that selected ‘Yes’ or ‘Maybe’ (in the questionnaire) to participating as a case study site were considered eligible sites (n = 143, or 82% of the respondents).

| Table 1. Zoo respondent’s position with the zoo (n = 172). |  |
|---|---|---|---|---|
| Education staff | Director/curator/ owner | Vet/keeper/senior staff | Position not specified | Total responses |
| 88 (51%) | 32 (19%) | 9 (5%) | 43 (25%) | 172 |
Due to visitor interviews being central to data collection for the case studies, we determined that a high visitation rate was necessary to provide enough potential participants within a limited time frame. Therefore, all eligible zoos with an annual visitation of 500,000 or more were contacted by email to initiate further discussion. Although we recognised that this process may have introduced some selection bias into the choice of case study sites, we also believed it more important on balance to maximise the likelihood that sufficient visitor data would be gathered during the week spent at each site. Zoos interested in participating were shortlisted as potential sites. Consideration was then given to: language (if non-English speaking, was an interpreter to be provided by the zoo?); and suitability of proposed research period for the zoo and its education department. Ultimately, the nine zoos visited as case study sites included: 6 sites that have English as their primary language (a translator was provided for the remaining three); 8 sites with visitation in excess of 1000,000 per annum; 3 sites that are private and six that are government-funded; 3 sites among the 10 largest zoos in the world including both the zoo with the highest visitation and the largest zoo in the world (based on land area and the size of the animal collection).

Each case study visit was limited to seven days. The data collection process involved an extensive site analysis to place each zoo within its own context. Data collection methods included contextual observation, a photographic record, visitor interviews, education staff interviews and observation of and participation in special tours. The data used in this paper, in addition to that from the online questionnaire, are derived from zoo staff interviews and visitor interviews.

Case study zoos were required to allow their head of education to be interviewed. Zoos were also requested to allow education area co-ordinators, especially volunteer co-ordinators, interpretive staff and general educators to be interviewed. Whilst it was at the discretion of each case study site, all sites provided a zoo staff member for each area of education within their zoo that included both formal and informal education. Twenty-eight staff members were interviewed across the nine case study sites. In all cases, the head of education was interviewed and at two sites the zoo directors were also interviewed. The remaining interviewees included area co-ordinators (such as volunteer, school and curriculum) and general educators – typically this accounted for all education types and staff within each case study site. The interview protocol consisted of 18 questions requiring a time investment of between thirty minutes and one hour, depending on the respondents’ level of detail. The question relating to this paper was: ‘Do you think that general visitors come to your zoo with an expectation or hope of learning?’, asked in an open format to allow for elaboration.

Sixty general zoo visitors were interviewed at each of the nine case study sites. During methodological development, it was planned to interview 50 zoo visitors. However, 60 visitors were interviewed at the first site, setting the benchmark for all sites and resulting in a total of 540 interviews. Clearly, the duration of each site visit
limited the number of visitor interviews conducted, and we readily acknowledge that 60 interviews, even though recruited at random during site visits, limits the generalisability of visitors’ responses to all those possible at any zoo. An important purpose in conducting visitor interviews, however, was to gather a rich mix of qualitative and quantitative data that together afforded us deeper (rather than broader) insight into visitors’ views and intentions.

Visitors were recruited deep within each zoo maximising the likelihood that the respondents had seen at least some of the exhibits prior to being interviewed. Focal sampling with a continual ask was employed to interview visitors over 18 years of age. Each zoo visitor interview took approximately five minutes. The participation rate was very high, above 80%. A summary of participants’ age and gender is shown in Figure 1.

The focus of the visitor interview included pre-visit information such as why they came to the zoo; participation in activities within the zoo; the importance of zoo activities; behaviour relating to animal visibility and reading signage; educational needs and preferred delivery; and their day’s highlight. The section of the visitor interview used for this paper focused on visitors’ educational needs. Visitors were initially asked why they were visiting the zoo to ascertain the primary motivation of their visit. They were then asked what they hoped to learn or discover during their zoo visit to establish if they had a learning agenda. Both questions were open-ended. It is acknowledged that asking visitors what they hoped to learn or discover during their zoo visit may be considered a leading question. However, the majority of responses given by zoo visitors provided an indication of whether or not they had a general learning agenda. For example, ‘Nothing, just here to see the animals’ was categorised as ‘no learning agenda’ or ‘To see animals we haven’t seen before, to see them in real life’ was categorised as ‘learning agenda’. It should also be noted that the intention was to understand visitors’ learning agendas in a general sense, not whether visitors’ learning agendas aligned with zoos’ desired visitor learning outcomes or whether learning was a visitor’s main or primary reason for visiting the zoo.

Also, we acknowledge that zoos participating in this study may have interpreted visitor learning in relation to their own mission statements and their desire for

![Figure 1. Summary of interviewed visitors’ age and gender (n = 540).](image-url)
visitors to learn about key conservation issues; however, in this study, learning is conceptualised in a much broader way than retaining cognitive messages given by the zoo.

All interviews were overtly voice recorded which reduced the need for transcribing answers during the interviews, ensured the accuracy of data and enabled respondents to answer questions in their own words without being limited to a set writing space.

Data analysis
For both the online questionnaire and case study interviews, quantitative data were analysed using MS Excel, enabling statistical and graphical comparisons to be made. For example, $\chi^2$ tests were used to determine statistical significance of observed differences in responses between zoo staff and zoo visitors. Due to the data being nominal and the presence of more than two categories the $\chi^2$ test of independence was considered the appropriate non-parametric test to compare frequencies across groups.

The qualitative data gathered through the open-ended questions were analysed by first manually coding each response according to its individual characteristics. Using the various codes, the data were then organised into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorised and grouped within themes and no new concepts or themes were evident. To ensure consistency, the first author conducted all coding and analyses. Additionally, the language and terminology used for the questions relating to this paper were audience specific for either zoo staff or the visitors.

For the purpose of this study, formal evaluation measures included questionnaires, surveys, or structured interviews whether they were conducted face-to-face or over the Internet. All other evaluation measures noted by zoos were classified as informal measures; these included casual conversations with visitors or casual visitor feedback, personal opinion, observation and due to its subjectivity, anecdotal evidence.

Findings

Research question 1: do zoos believe that visitors have a hope or expectation of learning something when they visit the zoo?

Research question one investigates the extent to which zoo staff believe that general visitors come to the zoo to learn. Figure 2 summarises the online questionnaire responses from 172 zoos to a closed question asking ‘Do visitors come to your zoo to learn?’ with ‘yes’ or ‘no’ response options. Figure 2 also summarises the case study interview responses to a closed item asking 28 zoo education staff, from nine case studies, ‘Do you think that general visitors come to your zoo with an expectation or hope of learning?’ Whilst this question’s format was closed, the interview process allowed for elaboration and further questioning. In the majority of cases (15 of 28), interviewees began their response with a definitive ‘yes’ or ‘no’ and then elaborated on their answer. The remaining responses required further analysis. For
example, ‘Like to think so. Parents often read signs to the children’ was categorised as a ‘yes’ response. Whereas, the response ‘Parents like to take their kids on educational outings, but I don’t think people come to the zoo to learn, zoos are entertainment’ was categorised as a ‘no’ response.

The data from the online questionnaire show that three quarters of responding zoos (129 of 172) believe that their visitors come to their zoo with a hope or expectation to learn. This is in contrast to the face-to-face responses given by zoo staff during case study interviews. Less than half the zoo staff members interviewed consider that their visitors come to the zoo with a hope or expectation of learning (Figure 2). This is interesting when also considering the responses of 540 zoo visitors interviewed at the nine case study sites.

Visitors were initially asked why they had visited the zoo, to ascertain their main or primary motivation. They were then asked what they hoped to learn or discover during their zoo visit to establish whether or not the zoo visitors had a learning agenda. Each of these responses was analysed and placed into one of three categories: visiting to learn or discover (for example: to observe the animal behaviour; to learn about animals and where they are from; to touch the rays and sharks to see what they feel like); not visiting to learn or discover (for example: to relax; nothing, came here for the entertainment; not about learning; didn’t want to learn just here to relax); indeterminate, which included answers that could not be classified as visiting to learn or not visiting to learn (for example: nothing specific; didn’t expect snow for the polar bears; fun day out). Each visitor’s response was analysed in conjunction with their response to why they were visiting the zoo, their primary motivation. It should be noted that some might view the primary motivation categories as similar, for example, ‘family outing’ and ‘entertainment’. However, further analysis of the data showed that whilst a family may respond with ‘family outing’ an elderly couple may respond with ‘for entertainment’ and as there were only so many reasons respondents gave for their zoo visit and it was decided to keep these categories expanded to provide a better indication of visitors’ reasons and learning agendas. Figure 3 summarises zoo visitors’ responses showing their primary motivation and if they had a hope or expectation of learning something during their zoo visit, a learning agenda. Also, rather than maintain a separate category showing indeterminate answers, these have been shown as a ‘no’ response in Figure 3.
Figure 3 shows that the most frequent primary motivation for visiting the zoo is related to children or a family or holiday outing. The majority of visitors citing this motivation also provided a response to the question what they hoped to learn or discover that was analysed as a learning agenda. For example: primary motivation ‘Show their daughter’, what they hoped to learn or discover ‘to know about animals and where they come from’; primary motivation ‘Family day out’, ‘to show the kids that the animals in the Madagascar movies are real’. This trend continues through the eight most frequent primary motivations for visiting the zoo, accounting for 92% of the responses (543 of 589). This suggests that visitors’ primary motivation may not necessarily be associated with their hope or expectation of learning during their zoo visit. This is further supported by the primary motivation response ‘be surrounded by/connect with nature which shows that the majority of respondents did not have a learning agenda (Figure 3). For example: primary motivation ‘Take grandson to the zoo to show him the animals and connect with nature’, ‘Didn’t want to learn anything about animals, just show the animals to grandson’. This type of response suggests that even though a visitor may enjoy and want to connect with nature and share that connection with a child, they may not necessarily want to learn about it.

Zoo visitor data relating to having or not having a learning agenda was analysed and summarised for comparison with responses from zoo staff (Figure 4).

The zoo visitor interview data provide an indication that the majority of interview participants (72%) report a desire to learn or discover. Three hundred and eighty-six people (72%) gave a response that could be categorised as a learning agenda for their zoo visit. Only 17 people (3%) stated categorically that they were not there to learn. The remaining 137 people (25%) gave an ambiguous answer that could not clearly be defined as either having or not having a learning agenda.
Figure 4. Comparison between zoos’ responses and zoos’ visitors’ responses about whether visitors come to learn.

When comparing visitors’ response to those of zoo staff, the data show that the online zoo questionnaire and zoo visitor responses are very similar. This is in contrast to the zoo case study staff interview responses, which revealed opposing views to both the questionnaire responses and the responses of the zoo visitors within their own zoo. A Pearson $\chi^2$ test indicated that the difference was statistically significant ($\chi^2 = 107.336$, df = 2, $p = 0.000$). Also, due to one cell having an expected value less than five, a Cramer’s $V$ test was conducted and also showed that the difference was statistically significant ($V = 0.422$, $p = 0.000$). In 28 face-to-face interviews, case study staff predominantly indicated that they do not believe visitors come to the zoo with an expectation or hope of learning. Further analysis of staff interview responses compared to those same zoos’ online response found that two of the nine case study sites responded ‘yes’ to the online question but ‘no’ during the face to face interview. In both these particular situations (though this was not always the case), the online respondent was also interviewed during case study data collection and gave an opposing view during the interview to that given within the online questionnaire. Both answered ‘yes’ in the online questionnaire and during face to face interviews: the first answered the question by saying ‘They visit the zoo for recreational activities’; and the second answered ‘No, they come for a fun day out’.

Research question 2: what do zoos report their general visitors want to learn and how is that determination made?

Research question two investigates what zoos believe their visitors want to learn during their zoo visit and also how they know what visitors want to learn. Figure 5 summarises the response to five questions each using a three-point rank scale asking zoos what importance visitors would give to learning about a topic (least important, average importance and most important). Each topic was asked in turn to enable zoos to select the most appropriate response, rather than be limited to selecting a rank order for the five topics.

The data show that zoo questionnaire respondents believe that visitors place priority on learning about animal biology and ecology, with most responding zoos giving this an average or high rating of importance. Zoos also report that visitors prioritise learning about zoo conservation actions and the conservation
status of animals, with a difference of only 4% between these top three topics when comparing least important ratings (12, 14 and 16%, respectively). The topics with the largest least important ratings, as reported by zoos, show that zoos believe their visitors are least interested in learning about what they (zoo visitors) can do to help save the animals (24%) and the role of humans in environmental problems (29%). However, it should be noted that more than 70% of responding zoos rate these topics as having average or high importance to their visitors and their agenda for learning. As such 70% of responding zoos believe that their visitors rate the importance of all these topics as important or very important to learn during their zoo visit. In addition, there were also 22 responses to an open ‘other’ question asking zoos what else their visitors come to learn about. Of these responses, the two most frequently reported were to learn about animals within different cultures (six responses) and to learn about plants (five responses).

Zoos were then presented with an open-ended question asking what methods they use to determine what their visitors want to learn (Figure 6).

The majority of zoos depend on informal measures to determine what visitors want to learn with an average of more than half (58%) citing casual feedback, per-
sonal opinion, observations and anecdotal evidence (Figure 6). Less than half (41% on average) of responding zoos report using questionnaires, surveys and interviews. It is interesting to note the inclusion of visitation numbers (7% on average). It is difficult to see how visitation numbers might indicate what visitors want to learn or whether they arrive with a learning agenda. Further analysis revealed that an average of only 15% of responding zoos report using both formal and informal measures to determine what visitors want to learn.

Research question 3: what do visitors want to learn during their zoo visits and how does that compare to what zoos’ believe their visitors want to learn?

Research question three investigates zoo visitors’ responses when asked what they hoped to learn or discover during their zoo visit. Figure 7 summarises the interview responses that 540 zoo visitors, at nine case study zoos, gave to an open question. Each zoo visitor’s whole response was then categorised as: having a learning agenda; not having a learning agenda; or indeterminable (Figure 7). Comparison was then made between what zoos believe visitors want to learn and what visitors actually report as important for their learning.

Note: some visitors gave multiple answers, all of which are represented in the figure. Each visitor’s whole response was then categorised as having learning agenda, not having a learning agenda or learning agenda indeterminable, the total of which are given in brackets within the key.

The data show that the majority of visitors (72%) reported a learning agenda when they visited the zoo. Seeing ‘new’, ‘unusual’, ‘exotic’ or ‘live’ animals accounted for the majority of visitors’ responses (44%). Visitors who responded, ‘to see the animals’ (15%), without the addition of words to identify a learning agenda, were categorised as having an indeterminable learning agenda. This was also the case for visitors who responded with a generalised answer such as ‘to have a look around’. Animal shows within the case study zoos varied greatly with their educational content, as such when visitors responded with ‘nothing, just to see the shows’ their response was categorised as having an indeterminable learning agenda.

Figure 7. What visitors want to learn or discover during their visit as reported by zoo visitors from nine case studies (597 responses from 540 zoo visitors).
(all responses relating to shows which were categorised as being indeterminable accounted for less than 1% of respondents). Whilst visitors may have been exposed to educational content during the show, it was not possible to determine if the visitors had a learning agenda for their zoo visit. A follow-up question may have provided more clarity enabling accurate learning agenda determination. Interestingly, only 19 responding visitors reported that they were not visiting the zoo to learn (3%). Also, a small number of visitors (3) reported that whilst they were not expecting to learn during their zoo visit, they were receptive to a learning experience. Due to the open nature of the visitors’ interview question it is difficult to directly compare the zoos’ and visitors’ responses about what visitors want to learn during their zoo visit. The data do tell us that the nearly four fifths of visitors (418) place great priority on seeing the animals and nearly 90% of zoos report animal biology and ecology as the visitors’ top learning priority (Figure 5). Given that observation is one of the most important aspects of studying animals and their environment, it could be argued that these are similar or compatible priorities. Further research using consistent questions for both the visitors and zoos would enable a more direct comparison. The data also demonstrate that the majority of zoos rely on informal measures to ascertain what their visitors want to learn with about a third reporting the use of formal measures (Figure 6).

Discussion
This study aims to improve current understanding of the learning-related expectations of people visiting zoos. This is achieved by examining zoos’ understandings about visitors’ learning intentions and also visitors’ general learning agendas when visiting a zoo. Through responses to an online questionnaire and zoo staff interviews, this research examines zoo staffs’ understanding of learning as part of their visitors’ agendas. With the addition of information gained through zoo visitor interviews, the research compares zoos’ perspectives about their visitors’ learning with the actuality of visitors’ intentions. Thirty-three years after Laetsch et al. (1980) reported that only 30% of zoo visitors specified learning as a reason for their visit, this research provides a different finding. This study indicates that when visitors were asked what they hope to learn or discover, more than 70% of visitors provided a response that was coded and categorised as a desire to learn (Figure 7). This increase in zoo visitors’ desire to learn supports Falk’s (2005) notion that individuals are guided by their own interests and actively engage in free-choice learning. When asked what they hoped to learn or discover during their zoo visit, the majority of visitors cited the viewing of animals (Figure 7). Visitors’ responses, with the addition of key words such as ‘live’, ‘real’, ‘unusual’, ‘new’ and ‘exotic’, suggested that the visitors were observing the animals with a learning purpose or agenda. The difference in percentages of visitors coming to learn as reported by Laetsch et al. (1980) compared to these findings could be attributed to several different aspects. Firstly, Laetsch et al.’s (1980) study seemed to focus on visitors’ primary motivation whereas this study inquired beyond visitors’ primary motivations asking specifically about their learning expectations. Secondly, today’s zoo visitors appear to have a more sophisticated knowledge of animals and a stronger motivation to learn than might be expected, as shown in the findings of several studies (Falk 2005; Falk et al. 2007; Vernon and Boyle 2008). Thirdly, zoos have increasingly
promoted themselves as educational institutions (Packer and Ballantyne 2010), possibly altering visitor perceptions of zoos. Further, many modern zoos are increasingly overt in providing informal education for their visitors. In turn, zoo visitors may consider a day at the zoo entertaining and family fun, but also a location for satisfying their curiosity and interests relating to animals and the environment, engaging in free choice learning. This view resonates with Falk, Moussouri, and Coulson’s (1998) museum research where the notion that entertainment and education ‘should not be viewed as mutually exclusive motivations’ (118) but rather ‘complementary aspects of a complex leisure experience’ (Falk, Moussouri, and Coulson 1998). Their research showed that whilst visitors who expressed a ‘high education motivation’ demonstrated ‘significantly greater learning’, visitors who expressed ‘a high entertainment motivation’ not only demonstrated ‘significantly greater learning’ but also ‘spent more time in the exhibition’ (Falk, Moussouri, and Coulson 1998, 117). The findings within this study are consistent with the view that an entertainment motivation (or most of the primary motivations given by visitors in this study) can include a learning agenda.

This research shows that the act of observing zoo animals is of paramount importance to visitors and, as identified by Briseno-Garzon et al. (2007), has a strong influence on their free-choice learning. This view also resonates with the findings of Dierking et al. (2002) who reported that whilst visitors did not cite learning as their primary motivation, their desire to view animals resulted in free choice learning which led to learning about conservation issues and sometimes feelings of helplessness.

The revelation that visitors want to see animals will not surprise anyone, but what should be acknowledged is that when asked what they hoped to learn or discover during their zoo visit, visitors noted a desire to see ‘new’, ‘unusual’ or ‘live’ animals. These responses may suggest that visitors perceive particular types of observation of animals as a learning activity. This is something that zoos would do well to consider when designing exhibits, information and interpretation. For example, providing visitors with information relating to an animal’s most active period during the day or showing visitors the animal’s favourite resting places within the enclosure improve a visitor’s chance of seeing the animal. Helping to ensure visitors actually see the animals on display provides zoos with the opportunity to capture visitor interest potentially facilitating engagement in free-choice learning and improving visitors’ access to zoos’ conservation messages. In regard to visitors feeling a sense of helplessness, some case study zoos were observed to provide visitors with simple double actions that could be incorporated into their daily lives and contribute to conservation efforts. Whilst these were not the focus of this study, the act of empowering visitors with actions for change could help resolve issues of helplessness (Stoinski et al. 2002) and further research into the potential benefits of this type of education is recommended.

Whilst zoos may want visitors to do more than look at animals, visitors’ interests and desire to see animals provide zoos with a powerful means of connecting educationally with their visitors (Anderson et al. 2003; Association of Zoos and Aquariums 2007; Packer and Ballantyne 2010; Stoinski et al. 2002) This study shows that responding zoos across the world have a consistent view in relation to their visitors coming to the zoo to learn (Figure 4). Also, when compared to visitors’ responses, most zoos have an accurate understanding that the majority of their visitors have learning within their visit agenda (Figure 4). An interesting finding,
uncovered when participating zoo staff were asked if their visitors come to learn, was the contrast between responses given through the online questionnaire compared to those provided in face-to-face interviews (Figure 2). Seventy-five per cent of online respondents indicated that their visitors had a learning agenda whereas 6 out of 10 staff participating in face-to-face interviews said that their visitors do not have such an agenda with only 39% believing their visitors came to learn. Several methodological factors could have contributed to this contrast. Firstly, there is a small difference in the question wording: ‘Do visitors come to your zoo to learn?’ (online question) versus ‘Do you think that general visitors come to your zoo with an expectation or hope of learning?’ (case study interview question). Secondly, the difference in responses could be related to the positioning of the question within each instrument (towards the end of the online questionnaire versus among the first questions within staff interviews). Thirdly, online respondents were given ‘yes’ and ‘no’ options whereas case study zoo staff interviews provided respondents with the opportunity to expand their answer. Despite these small methodological variations, however, it remains challenging to explain how these factors could result in such contrasting responses. Thus, it seems more likely that the observed difference in online survey and interview responses could be attributed to either the respondents’ conceptualisation of learning, their own understanding or definition, or the context surrounding zoo participants’ involvement. Zoo staff responding to the online questionnaire may have been inclined to over-optimistically report their views of visitors’ learning, whereas staff in face-to-face interviews may have been inclined to be more conservative in their responses. One factor thought to contribute to different interview technique responses is the effect of time and place (Opdenakker 2006). Zoos responding to the online questionnaire had the control to complete the questionnaire within their own timeframe and at their own pace. Zoo staff members participating in face-to-face interviews were typically locked into a predetermined time and there was little delay between question and answer, resulting in a more spontaneous response (Opdenakker 2006). Also, online respondents may have felt a sense of de-personalisation influenced by physical distance from the researchers (Opdenakker 2006) enabling them to respond more optimistically without concern of verification. Face-to-face interviewees, on the other hand, may have felt a strong sense of personal scrutiny, understanding that their responses could be checked or verified potentially leading to more conservative responses. This notion is supported within this study in that two of the zoo staff responding to the online questionnaire reported that their visitors come to learn, yet those same individuals reported during their face-to-face interview that their visitors do not come to learn. The difference in online and face-to-face responses raises an important question, which is more accurate?

Given that more than 170 zoos across all major regions of the world, responded to the online questionnaire one might be inclined to be more trusting of that result. However, the likelihood is that the true answer probably lies somewhere in between the face-to-face interview result of 39% and the online questionnaire result of 75%. This highlights the importance and potential benefits of conducting a mixed-methods study. The use of both an online questionnaire and face-to-face interviews revealed an interesting anomaly that would not have been identified had a single instrument been used and points to an issue worthy of further research to ascertain why such a difference was found between the online responses and the case study interviews.
When analysing the measures zoos report using to determine their visitors' learning agendas, the majority were found to depend on informal measures (Figure 6). This study has used formal measures to determine that more than 70% of responding zoo visitors from the nine case study zoos report a desire to learn or discover something during their zoo visit (Figure 7). On the other hand, from those same case study zoos, less than half the education staff interviewed believed that their visitors have a learning agenda (Figure 2). This suggests that the use of informal measures may not provide all zoos with an entirely accurate indication of their visitors' needs, specifically their learning agendas.

This notion is further supported when examining what zoos believe visitors want to learn during their zoo visit and how the zoos have made that determination. Participating zoos believe that visitors place priority on learning about animal biology and ecology, what the zoo is doing to help save the animals and the conservation status of animals (Figure 5). The zoos also believe that visitors are least concerned with learning about the role of humans in environmental problems. When asked how these determinations were made, zoos indicated a strong reliance on informal measures to ascertain their visitors' learning agendas. Whilst there are some differences in zoos' ratings of visitors' learning priorities, the average ratings also show consistency across all the learning areas (Figure 5). This could be an indication that zoo staff respondents have provided a 'safe' answer given that their views are based on informal measures and cannot be substantiated. This thought is further supported by the findings that visitors were interested in learning about several aspects that were not noted by responding zoos as part of their visitors' learning agendas. More than 20% of participating visitors identified animal welfare issues, the changes within a zoo and how one zoo compared to another as part of their learning agendas (Figure 7). However, not a single participating zoo identified these as something their visitors were interested in learning about. Zoos would benefit, therefore, from the utilisation of more formalised methods of data gathering to gain a more accurate and contemporary understanding of their visitors' learning agendas.

Learning is no longer regarded as a simple, linear process. Learning is 'rarely an instantaneous event' (Falk 2005, 269) but rather a building process that takes time and the accumulation of knowledge and understanding. As such, when measuring the impact of an informal learning experience, it is important to consider events that occurred both prior to and after that experience from an individual’s perspective (Bell et al. 2009). Past research has indicated (Falk 2006) that despite differences between visitors who wanted or intended to learn and those who didn’t, both groups did actually learn. Modern zoo visitors acknowledge that they are willing to engage in free choice learning during their zoo visit; learning is an important part of their visiting agenda. Zoos are now in a more informed position to accommodate visitors’ needs and to provide the type of information that builds on their interests and knowledge, encouraging free-choice learning. This provision can help guide visitors to absorb the conservation messages zoos want to give. Leading visitors towards becoming environmentally aware citizens equipped with a range of potential actions for living sustainably and importantly, for contributing to the conservation of animals.

Acknowledgements
Special thanks to all the zoos that participated in this research and to the associations that provided their support including the International Zoo Educator’s Association, the Canadian
Association of Zoos and Aquariums, the Pan African Association of Zoos and Aquariums and the European Associations of Zoos and Aquariums. Special thanks also to Chapultepec Zoo, Colchester Zoo, Columbus Zoo and Aquarium, Johannesburg Zoo, Loro Parque, Moscow Zoo, Taronga Zoo, Toronto Zoo and Zoo Negara for their outstanding contribution to this research (these zoos are not listed in site order and permission has been granted for acknowledgement).

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References


Study 2: *The role of zoos in modern society – a comparison of zoos’ reported priorities and what visitors believe they should be.*

Study two sought to understand how education fits within zoos’ roles and responsibilities. When discussing zoos collectively it is important to bear in mind that not all zoos operate with equal standing. Whether publicly or privately owned, each zoo is influenced by a number of factors that will combine to create each zoo’s unique context. Zoos, as institutions, are influenced by internal factors such as the extent of their animal collection, staffing levels and service facilities and external factors such as community acceptance and sponsorship to name a few. As such, these contextual factors and a zoo’s operational budget will influence how zoos prioritise their roles and responsibilities. The challenge for zoos is to align their priorities with those of their community (Kohl, 2004; Morgan & Hodgkinson, 1999). Within zoos’ mission statements, conservation and education tend to be prominent themes suggesting that these are important elements in zoo culture (Patrick et al., 2007).

Study two investigates the role of zoos in modern society from both zoos’ and their visitors’ perspectives. Modern zoos are required to fulfil a growing number of responsibilities including, but not limited to, collection management, scientific research, wildlife conservation, public recreation and education (Fa, Funk & O’Connell 2011; Kisling 2001; Kohl 2004; Mason, 2008; Peart 1993; Wineman et al., 1996). With so many roles and responsibilities and limited resources, zoos have to prioritise their activities in relation to their own specified goals, objectives and mission statements. Also, zoos are influenced by community expectations and given that a review of the literature conducted by Dierking et al. (2002) found that there was a significant gap between public perception of zoos and what zoos believe they are designed to accomplish, there was a need to understand current views and possible divergences. The study therefore contrasted the priority given to zoo activities from each perspective to determine how well zoos’ priorities aligned with community expectations, particularly in terms of zoos’ role as educators.
The Role of Zoos in Modern Society—A Comparison of Zoos’ Reported Priorities and What Visitors Believe They Should Be

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ABSTRACT Modern zoos are required to fulfill a growing number of responsibilities including scientific research, wildlife conservation, public recreation, and education. With so many roles and responsibilities and limited funds, zoos have to prioritize their activities in relation to their own specific goals, objectives, and mission statements. Given their desire to nurture community relations and educational opportunities, it is important to determine the extent to which zoos are prioritizing their activities, according to visitors’ expectations. This paper presents empirical research of a two staged mixed-methods investigation into zoo priorities from both zoos’ and visitors’ perspectives. The first stage involved an online questionnaire to which more than 190 zoos across 52 countries reported their priorities and activities. We then undertook in-depth case studies in nine institutions, enabling direct observation of each site within its context, including face-to-face visitor interviews. Our research contrasts the priority given to zoo activities from each perspective and indicates that educating visitors, including school children, is the highest priority activity from the zoo’s perspective and that of their visitors. The findings also show that visitors place high value on learning about actions they can take to help conservation efforts. Some inconsistencies between zoos’ and visitors’ priorities were also evident, such as the different emphasis placed on viewing endemic species, and zoos being a place for people to relax and socialize. The implications of these findings are discussed.

Keywords: community, conservation education, zoo activities, zoo roles, 2006

Throughout their history, zoos’ roles and activities have evolved (Kisling 2001). At the same time, each zoo has evolved within its own particular context and its development influenced by many
factors. Whether publically or privately owned, each zoo is influenced by external factors such as community acceptance and sponsorship, and internal factors such as the number and type of animals, land area, and historic value which combine to create each zoo’s unique character or context. Despite these contextual differences, zoos have been expected to fulfill a growing number of responsibilities including scientific research, wildlife conservation, and public recreation and education (Pearl 1993; Wineman, Piper and Maple 1996; Kising 2001; Kohl 2004; Fa, Funk and O’Connell 2011). Like modern corporations, most zoos have mission statements that are intended to summarize their aims and objectives (priorities). Conservation and education tend to be prominent themes, suggesting that these are important elements within zoo culture (Patrick et al. 2007). Some authors also claim that zoos are a valuable resource, and ideally positioned, for providing conservation education to large groups of people and for reconnecting an increasingly urbanized public with the natural world (Gutierrez de White and Jacobson 1994; Hancock 2001; Miller et al. 2004; Patrick et al. 2007). However, with multiple competing roles and responsibilities as well as limited funds, zoos prioritize activities in line with their own specific goals and objectives.

From their earliest establishment, zoos have had the capacity, and often the intention, to influence visitors. Egypt’s Queen Hatshepsut held one of the earliest documented animal collections, dating back to 1500 BC. Her extensive collection was not only a deliberate display of her wealth but also represented the “spoils of war and conquest” (p. 17), demonstrating to her people that she was a powerful and successful leader (Pearl 1993). During the European Renaissance period (1456–1528) animal collections became known as menageries, where many privately owned collections became public, cultural institutions where husbandry and exhibition standards improved (Kising 2001). Throughout the 19th century, the menageries, now called zoos, evolved into simple, yet highly educational, taxonomic collections of animals that were used for both research and public recreation (Kising 2001; Kohl 2004). The 20th century, however, was a period when the public and scientific community questioned the need for and purpose of zoos. Zoos responded by diversifying their roles and responsibilities toward conservation (Maple 1995).

The introduction of captive breeding programs during the 1940s allowed zoos not only to help save endangered species, thus addressing a community concern, but also to justify the need for zoos by engaging them in conservation action (Pearl 1993). Additionally, zoos identified a need for greater involvement in scientific research and also community education, a role now embedded within zoos’ mission statements and considered by many as their greatest contribution to society (Gutierrez de White and Jacobson 1994; Norton et al. 1995; Hancock 2001; Miller et al. 2004; Patrick et al. 2007).

More recently, zoos have also been seen as venues for providing an increasingly urbanized public with relatively intimate nature and animal experiences. The argument has been that, in order to engage people in active conservation behavior, it is essential to provide them with intimate animal-related experiences that serve to reconnect them with the natural world (Tanner 1980; Vining 2003). With more naturalistic animal displays and extensive botanical gardens, zoos provide an avenue for people to connect with nature and at the same time learn about conservation issues (Bostock 1993; Hancock 2001; Kising 2001).

Charged with a growing number of roles and responsibilities, zoos focus on the various issues they perceive as most relevant to their particular context (WAZA 2005). Given zoos’ general desire to nurture and enhance community relations and educational opportunities alongside meeting research and conservation responsibilities, zoos on occasion review their goals,
objectives, and activities; their mission statements. Fraser and Sickler (2008) have suggested that zoos align their mission statements with community values, to maximize communication between zoos and their visitors “to the best advantage for conservation” (p. 18).

To ensure that they communicate effectively with their visitors, zoos must understand who their visitors are and what they expect from the zoo (Morgan and Hodgkinson 1999; Peart 2003; Kohl 2004). Whilst zoos have evolved and changed with community expectations, visitor expectations of zoos have also changed. Some visitors will be from the local region and others from abroad, but all will arrive with their own personal context and visit agenda (Briseno-Garzon, Anderson and Anderson 2007). For example, in many parts of the world general zoo visitors have knowledge of rudimentary animal biology and seek a more comprehensive understanding of animals and their habitat during their zoo visit (Yemon and Boyle 2008). Similarly, animal welfare has been a visitor concern, with visitors making judgments on what they see, preferring naturalistic enclosures (Kling 2001; Mejí, McCormick and Gibbs 2004). Given these considerations, visitors will have their own perceptions of what roles and responsibilities zoos should be prioritizing.

So how do zoos prioritize various responsibilities and what zoo activities are most important for their visitors? How consistent are zoos’ priorities with those of their visitors? To provide empirical answers to these questions this research examines the reported priorities of over 190 zoos across 52 countries, and the priorities of 540 zoo visitors across nine case-study sites, providing an analysis of priorities for zoos and their visitors on a global scale. Two research questions were posed for this study:

1. What do zoos report as their institutional priorities?
2. What do visitors believe zoos’ priorities should be and how do they compare to those reported by zoos?

Methods
The research questions examined within this paper, focusing on zoos’ priority roles and activities, are derived from a larger empirical study into zoo communication and education and the processes modern zoos use to understand and improve their educational provision. The empirical study was divided into two distinct stages. The first centered on an online questionnaire administered electronically to zoos around the world, to gather data from a large number of zoos within a relatively short period of time. The online questionnaire was designed to enable a broad-based description of how modern zoos design, implement, and evaluate the formal and informal education experiences they provide. The second stage of the study involved nine in-depth zoo case studies, facilitating direct observation and documentation of educational provision within each site. Case-study research enabled each zoo to be observed within its own context whilst also providing the opportunity for face-to-face interviews with zoo education staff and zoo visitors.

Stage 1: Online Questionnaire
The online questionnaire consisted of 62 questions, including 20 open-ended, 29 closed-response, 14 rating-scale, and four multiple-choice items. The questionnaire consisted of three sections: 1) general zoo information, activities and mission statement; 2) types of education provision and its development, implementation and evaluation; and 3) zoo visitors and their perceived educational needs and priorities. The section of the questionnaire used for this paper focused
on zoo activities. Zoo respondents were asked to rate the priority of nine activities for their zoo, using a 5-point rating scale (very low priority, low priority, average priority, high priority, very high priority). An open item was also included to enable respondents to identify any other activities or roles they believed important that were not included in the nine listed activities. The questionnaire was developed and administered in electronic format, enabling zoos from all over the world to access the questionnaire via an Australian university web link. The online questionnaire also facilitated data collection in a format suitable for analysis without the need to manually enter responses into a spreadsheet, and thus avoided potential data entry errors.

Recruitment to participate in the online questionnaire involved direct e-mail contact and contact through the various zoo education associations around the world. The contact list of zoos was obtained from the International Zoo Yearbook (ZSL 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. It was not, however, possible to confirm that all e-mail addresses provided in the 2009 Yearbook (ZSL) were correct, and it is possible that a number of the 593 zoos were not actually contacted. This is particularly so for zoos in India, Japan, and Germany, from where 54 (9%) e-mail invitations were returned as undeliverable. For this reason, and to help ensure that invitations were directed to zoo staff in a position to respond, snowball sampling was also used to contact as many zoos as possible. Nevertheless, the vast majority of respondents (96%) to the online survey were those contacted by e-mail using the database provided by the International Zoo Yearbook (ZSL 2009).

To initiate snowball sampling, several zoo educators were contacted directly by e-mail or telephone and invited to participate in the study. Through their participation and support, details of the research project were printed in the International Zoo Educators Newsletter (April 2011), stating the IZE’s support of the research. All international zoo associations were also contacted resulting in the Canadian Association of Zoos and Aquariums and the Pan African Association of Zoos and Aquariums e-mailing their members requesting their participation. The European Association of Zoos and Aquariums also offered its support of the research and provided a mailing list of its members.

Zoo recruitment spanned seven months (December 2010–June 2011). The majority of respondents were education directors or coordinators, zoo directors, or education personnel. Zoos within the database were placed into one of three regions, depending on their geographical location (Table 1). Participation rates are provided in Table 1.

Table 1. Summary of invitations sent, responses received, and rates of participation, by geographical region.

<table>
<thead>
<tr>
<th>Region</th>
<th>Invitations Sent to Zoos</th>
<th>Zoo Responses</th>
<th>Zoo Response Rate</th>
<th>Countries in Region with Zoos</th>
<th>Country Response Rate</th>
<th>Case Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asia-Pacific</td>
<td>96</td>
<td>26</td>
<td>27%</td>
<td>16</td>
<td>65%</td>
<td>2</td>
</tr>
<tr>
<td>2. Europe, Middle East, and Africa</td>
<td>927</td>
<td>115</td>
<td>35%</td>
<td>43</td>
<td>81%</td>
<td>4</td>
</tr>
<tr>
<td>3. North and South America</td>
<td>170</td>
<td>50</td>
<td>29%</td>
<td>13</td>
<td>54%</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>550</td>
<td>191</td>
<td>32%*</td>
<td>72</td>
<td>72%*</td>
<td>9</td>
</tr>
</tbody>
</table>

*Total zoo response rate was 191 of 593 zoos or 32%. Total number of countries represented was 52 of 72 countries or 72%.
Stage 2: Nine Case Studies

During the planning phase of the research we proposed three case-study sites from each region. However, given the high number of zoos responding within Region 2 and the relatively low number within Region 1, two sites were selected from Region 1, four from Region 2, and three from Region 3, providing a total of nine case-study sites.

The selection of the case-study sites was determined using the following process. All zoos that selected “Yes” or “Maybe” (in the questionnaire) to participating as a case-study site were considered eligible sites (n = 143, or 92% of the respondents). Due to visitor interviews being central to data collection for the case studies, we determined that a high visitation rate was necessary to provide enough potential participants within a limited time frame. Therefore, all eligible zoos with an annual visitation of 500,000 or more were contacted by e-mail to initiate further discussion. Although we recognized that this process may have introduced some selection bias into the choice of case study sites, we also believed it more important on balance to maximize the likelihood that sufficient visitor data would be gathered during the week spent at each site. Zoos interested in participating were short-listed as potential sites. Consideration was then given to: language (if non-English speaking, an interpreter to be provided by the zoo?); and suitability of proposed research period for the zoo and its education department. The region and geographical location of each short-listed zoo were then considered. Ultimately, the nine zoos visited as case-study sites were: six sites that have English as their primary language (a translator was provided for the remaining three); eight sites with visitation in excess of 1,000,000 per annum; three sites that are private and six that are government-funded; three sites among the 10 largest zoos in the world including both the zoo with the highest visitation rate and the largest zoo in the world (based on land area and the size of the animal collection).

Each case-study visit was limited to seven days. The data collection process involved an extensive site analysis to place each zoo within its own context. Data collection methods included contextual observation, a photographic record, visitor interviews, education staff interviews and observation of, and participation in, special tours. The data used in this paper, in addition to that from the online questionnaire, are derived from visitor interviews. Sixty general zoo visitors were interviewed at each of the nine case-study sites. During methodological development it was planned to interview 50 zoo visitors. However, 60 visitors were interviewed at the first site, setting the benchmark for all sites and resulting in a total of 540 interviews. Clearly, the duration of each site visit limited the number of visitor interviews conducted, and we readily acknowledge that 60 interviews, even though recruited at random during site visits, limits the generalizability of visitors’ responses to those possible at any zoo. An important purpose in conducting visitor interviews, however, was to gather a rich mix of qualitative and quantitative data that together afforded us deeper (rather than broader) insight into visitors’ views and intentions.

Visitors were recruited deep within each zoo, maximizing the likelihood that the respondents had seen at least some of the exhibits prior to being interviewed. Focal sampling with a continual ask was employed to interview visitors over 18 years of age. Each zoo-visitor interview took approximately 5 minutes. The focus of the visitor interview included pre-visit information such as why they came to the zoo; participation in activities within the zoo; the importance of zoo activities; behavior relating to animal visibility and reading signage; educational needs and preferred delivery, and their day’s highlight. The
section of the visitor interview used for this paper focused on zoo activities. Visitors were asked to rate 11 zoo activities, indicating the importance they believe zoos should give to each activity, using a 5-point rating scale (very low priority, low priority, average priority, high priority, very high priority). An open item was also included to enable responding visitors to identify any other activities or roles they believed should be important to zoos that were not included within the listed activities. All interviews were overtly voice-recorded, which reduced the need for transcribing answers during the interviews, ensured the accuracy of data and enabled respondents to answer questions in their own words without being limited to a set writing space.

Data Analysis
For both the online questionnaire and case-study interviews, quantitative data were analyzed using MS Excel, enabling statistical and graphical comparisons to be made. For example, chi-square tests were used to determine the statistical significance of observed differences in responses to 5-point rating-scale items between zoo staff and zoo visitors. Chi-square was the statistical test used because response data derived from rating-scale-type questions are typically considered ordinal rather than equal interval, and hence a non-parametric test of differences between groups is considered most appropriate.

The inclusion of an open item provided additional qualitative data enabling each group to identify important activities that had not been directly considered within the rating-scale questions. Qualitative data gathered in this way were analyzed by first manually coding each response according to its individual characteristics. For example, a visitor’s response such as “zoos need to tell us how to get involved with the zoo and continuity conservation programs” was coded as “inform how to become involved.” Using the various codes, the data were then organized into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorized, and grouped within themes, and no new concepts or themes were evident. Additionally, the language and terminology used for the questions relating to this paper were audience specific, for either zoo staff or zoo visitors, to ensure comprehension and consistency in understanding.

Results
Research Question 1: What Do Zoos Report as Their Institutional Priorities?
Table 2 summarizes zoos’ responses to nine rating-scale questions. Figure 1 summarizes responses to an open item asking for “other” activities zoos rate as important for their institutions.

On average, the role given a high or very high priority rating by 93% of zoo respondents was “a place for visitors to learn about animals.” When analyzed regionally, the majority of zoos in both Region 2 (Europe, Middle East, and Africa) and Region 3 (North and South America) rated this activity highly important, indicating that these regions consider educating visitors their highest priority. Zoos within Region 1 (Asia-Pacific) most frequently indicated a zoo being “a place for school children to learn about animals and conservation” as a high or very high priority. Similarly, zoos within Regions 2 and 3 selected this activity as their second most important priority, and those in Region 1 selected “being a place for visitors to learn about animals” as their second highest priority. It should be noted that 1) these differences among regions are small and not statistically significant ($\chi^2 = 9.10, df = 4, p > 0.05$); and 2) the two items both address the educational mission of zoos, albeit with slightly
Table 2. Priority zoos give to zoo activities by region (values are percentages of respondents).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Low/Low Priority</th>
<th>Average Priority</th>
<th>High/Very High Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>R2</td>
<td>R3</td>
</tr>
<tr>
<td>A place to conduct captive breeding</td>
<td>4</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>A place for visitors to see endemic animals</td>
<td>31</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>A place to see animals from other countries</td>
<td>11</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>A place for visitors to learn about animals</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A place for visitors to learn about conservation issues</td>
<td>8</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>A place for school children to learn about animals and conservation</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>A place for all visitors to learn about the zoo’s role in conservation</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>A place for visitors to learn about their own role in conservation</td>
<td>4</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>A place for people to relax and socialize</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

R1 = Region 1 (n = 22); R2 = Region 2 (n = 115); R3 = Europe, Middle East, and Africa; R3 = Region 3 (n = 83); All = All regions (n = 191).
The Role of Zoos in Modern Society—A Comparison of Zoos’ Reported Priorities...

![Bar chart showing the percentage of zoos reporting various activities as priorities.]

Figure 1. Other important roles and activities as reported by zoos (82 zoos provided 82 responses).

different emphasis. Together zoos’ responses to these two items provide a very clear indication that across all three regions, the large majority of zoos consider education their most important priority.

It is interesting to note, however, that one zoo within Region 1 (Asia-Pacific) selected these education activities as a low or very low priority. Three zoos (3%) within Region 2 (Europe, Middle East, and Africa) also indicated that the education of school children was a low priority; however, none of the responding zoos in Region 2 indicated visitor learning as a low or very low priority, and not a single zoo within Region 3 (North and South America) rated either of these educational activities as a low or very low priority.

The only statistically significant difference in priority by region was for the role “a place to conduct captive breeding” ($\chi^2 = 10.49, df = 4, p < 0.05$). Captive breeding was considerably more important for zoos in Region 1 (Asia-Pacific) than in Region 3 (North and South America). Captive breeding was given high or very high priority by three quarters of zoos in Region 1, but by only half of the zoos within Region 3. On the other hand, the priority zoos in Region 1 gave to being “a place for visitors to learn about their own role in conservation” is notably lower at 60% than zoos within Region 3 (North and South America), where 80% of zoos indicated that this activity was a high or very high priority. This difference, however, was not statistically significant ($\chi^2 = 4.56, df = 4, p > 0.05$).

On average, zoos indicated that their lowest priority activity was being “a place for visitors to see endemic animals” (animals native to the zoo’s location). Only about 50% of zoos reported this as a high or very high priority, and this is consistent across the three regions.

The “other” activity most frequently reported by zoos as a priority was research, study, and training (Figure 1). Nearly half identified this activity as important within their zoo. Participation in conservation programs was also well represented, with nearly one-third of respondents noting its importance. Of the remaining roles or activities listed, 11% or less identified them as important priorities, suggesting that these activities are not considered priority roles or activities for zoos on a global basis. The low representation of these roles could also be attributed to the research instrument, and it is recommended that further research be conducted to examine the priority given to these activities.
Table 3. Priority values (%) given to zoo activities by visitors (n = 540).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Low/Low Priority</th>
<th>Average Priority</th>
<th>High/Very High Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>A place to conduct captive breeding</td>
<td>4</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>A place for visitors to see local animals</td>
<td>16</td>
<td>15</td>
<td>69</td>
</tr>
<tr>
<td>A place for visitors to see animals from other countries</td>
<td>3</td>
<td>6</td>
<td>91</td>
</tr>
<tr>
<td>A place for visitors to learn about animals</td>
<td>1</td>
<td>5</td>
<td>94</td>
</tr>
<tr>
<td>A place for visitors to learn about conservation issues</td>
<td>3</td>
<td>10</td>
<td>87</td>
</tr>
<tr>
<td>A place for school children to learn about animals and conservation</td>
<td>1</td>
<td>2</td>
<td>97</td>
</tr>
<tr>
<td>A place for all visitors to learn about the zoo’s role in</td>
<td>2</td>
<td>12</td>
<td>85</td>
</tr>
<tr>
<td>conservation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A place for all visitors to learn about their own role in</td>
<td>6</td>
<td>18</td>
<td>76</td>
</tr>
<tr>
<td>conservation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A place for people to socialize and relax</td>
<td>13</td>
<td>21</td>
<td>66</td>
</tr>
<tr>
<td>A place to raise funds for conservation work in the wild</td>
<td>4</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>A place for educating visitors about actions they can</td>
<td>5</td>
<td>14</td>
<td>81</td>
</tr>
<tr>
<td>take at home to help conservation efforts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Other activities that visitors suggested should be a priority for zoos (n = 118, single answer for each respondent).

Research Question 2: What Do Visitors Believe Zoos’ Priorities Should Be and How Do They Compare to Those Reported by Zoos?

Table 3 summarizes visitors’ responses to 11 rating-scale questions, which list typical zoo activities, and Figure 2 summarizes the “other” activities visitors report as important for zoos. Comparison is then made between visitors’ priorities and those reported by zoos (Figure 3).

Participating zoo visitors considered zoos’ most important activity to be “a place for school children to learn about animals and conservation” (Table 3). Ninety-seven percent of respondents rated this activity as a high or very high priority. Other activities that were well represented include: “a place for visitors to learn about animals” (94%); and “a place for visitors to see animals from other countries” (91%). The zoo activity that most frequently attracted a low or very low priority rating was “a place to see local animals” (16%). Similarly, a non-trivial percentage of visitor interviewees (13%) indicated zoos as “a place for people to socialize and relax” as a low or very low priority activity. Of the remaining activities, more than three-quarters of responding visitors rated them as high or very high priorities for zoos.
Within the “other” option, zoo-visitor respondents emphasized the importance of zoos prioritizing education, particularly for children, with more than one-third suggesting this activity as an important role for zoos (Figure 2). Whilst this role was well represented within Table 3, it is included in the analysis to highlight the importance visitors gave to education. Animal welfare was also well represented, with 25% of responding visitors stating that animal welfare was an important responsibility for zoos.

Eleven percent of visitors stated that zoos should inform visitors “how they can help” providing an indication that visitors may want information beyond what is currently provided. Visitors also highlighted their desire for more interactive exhibits and recreational areas (11%) and 10% sought more contact with animals, collectively suggesting that visitors want a more involved experience at the zoo.

Figure 3 compares visitors’ and zoos’ views on what activities should be are high priorities. In general, zoos’ priorities and those of their visitors appear consistent. The same priority proportions were recorded for “a place for visitors to learn about conservation issues” (86%), and the difference for “a place for visitors to learn about animals” was nominal (1%). The activity that recorded the greatest difference was “a place for visitors to see local animals,” where 7 in 10 visitors indicated this should be a high priority for zoos compared with less than half of responding zoos noting this activity as a high priority. Of the remaining activities, a difference of between 5 and 11% was recorded between zoo and visitor priorities. In all cases, a greater proportion of visitors gave the activities a higher priority than responding zoos, with the exception of “a place for people to relax and socialize”: a greater proportion of zoos prioritized this activity.

All activities returned a statistically significant difference in priority between zoos and visitors ($\chi^2 > 0.99$, df = 2, $p < 0.05$), except for “a place for visitors to learn about conservation issues” ($\chi^2 = 0.17$, df = 2, $p > 0.05$), “a place for visitors to learn about animals” ($\chi^2 = 0.80$, df = 2,
p > 0.05), and “a place for all visitors to learn about their own role in conservation” (χ² = 2.83, df = 2, p > 0.05).

The two remaining activities, “research and training” and “animal welfare” could not be statistically compared but were included to highlight priority activities from each perspective. Notably, not a single visitor identified research or training as a priority activity for zoos. Also, only one responding zoo mentioned animal welfare as a priority. Further analysis of this comment revealed that it referred to education for animal welfare, rather than the welfare of the animals within the zoo.

**Discussion and Implications**

This paper aims to provide a global overview of zoo priorities from both zoos’ and zoo visitors’ perspectives. Through 191 responses to an online questionnaire, this research offers a comprehensive indication of zoos’ priority activities. Additionally, case-study data gathered from nine site visits provide insight into visitor perceptions of what activities zoos should prioritize, and then compares the findings of each for their consistency. The implications discussed here are intended to assist zoos to further develop their position within their communities, and to highlight priority activities that are consistent with visitor perceptions.

Historically, zoos have been considered a place of recreation and relaxation where education needs to be subtle and clever (Anderson 2003; WAZA 2002; Packer and Ballantyne 2010). This research confirms that, from a global perspective, zoos currently prioritize public education as their highest priority, and that this is aligned with the expectations of their visitors. Visitors’ responses to all education-based activities suggest that they are not only receptive but have a strong expectation of learning during their zoo visit. Vining (2003) has argued that if people are provided with an intimate animal-related experience, they could be influenced to engage in active conservation behavior. Vernon and Boyle’s (2008) research discussed increased zoo-visitor knowledge and the visitors’ desire for a deeper understanding of animals and conservation. These notions are supported by this research, in that more than 80% of visitors prioritized “learning about actions they can take at home to help conservation.”

It is recommended that zoos actively promote sustainable living by focusing on the link between the threat to the animals visitors see at the zoo and the choices they make in their daily lives. For example, orang-utans are under threat due to habitat loss resulting from the production of palm oil. Showing visitors how to determine if an item contains palm oil, advising them to avoid purchasing that item, and offering an alternative would empower visitors with actions they can incorporate into their daily lives.

Consistent with zoo visitors’ prioritizing educational experiences, the study also shows that visitors give less importance to relaxing and socializing during their zoo visit. Zoos continue to identify relaxation as an important priority, significantly more frequently than their visitors. This supports Vernon and Boyle’s (2008) research and reflects a changing emphasis on the part of zoo visitors toward desiring additional and more intensive education opportunities within their zoo visits, a nuanced priority shift yet to be completely recognized by zoos.

One of the most interesting findings within the research was the difference between zoos’ and visitors’ perspectives in relation to zoos being a place for visitors to see local or endemic animals (animals native to the geographical location of the zoo). Nearly 70% of visitors rated this as a high or very high priority, whereas less than half of responding zoos rated it as an important role. The exhibition of endemic species would benefit both visitors from abroad and local visitors, especially school children. Tanner’s (1990) research identified the importance of
The Role of Zoos in Modern Society—A Comparison of Zoos’ Reported Priorities...

children being exposed to the natural world to encourage active conservation behaviors. If we accept that zoos provide an avenue for children to connect with nature, it could be argued that exhibits of local, native species would help children connect with their own natural environment, rather than one far away, and foster interest in local conservation projects. The display of endemic species would also benefit visitors from abroad, who may be unable to visit natural areas for wild viewing.

Given the importance visitors place on viewing local animal species, it is recommended that zoos give serious consideration to the development or enhancement of an endemic exhibit. It is also recommended that information pertaining to local environmental issues, and actions visitors can take to help conserve native habitats, also be provided. For example, zoos could suggest that visitors plant local native species in their gardens, explaining that the plants will provide a habitat for local native animals whilst also reducing the need for fertilizers, water, and pest control. This is something both local visitors and visitors from abroad can perform, and zoos would be empowering their visitors with doable actions, guiding them to living sustainably.

Research, study, and training were a priority activity reported by nearly 50% of zoos. Interestingly, not a single visitor identified research and training as an important role or activity for zoos. This difference suggests that zoos are involved in an activity they consider important but one that may be unknown to visitors. This is consistent with data relating to the importance of visitors learning about zoo roles in conservation. Visitors gave this activity a higher priority than responding zoos, suggesting that visitors want to know more about what zoos do for conservation. As such, it is recommended that zoos draw attention to these activities to improve visitor understanding and fully promote their contribution to conservation activities, training, and research.

Concerns regarding animal welfare were raised by 30% of visitors and are an issue synonymous with zoos, particularly in the last century. Mett, McCormick and Gibbs (2004) discussed that visitors typically base their perceptions on aesthetics, which could include the condition of the animal and the type of enclosure. It is recommended that zoos provide information regarding welfare and husbandry matters, especially potentially confronting concepts such as night quarters that are seen by visitors as bare concrete pens. An explanation detailing the importance of minimizing potential hazards to keep animals safe and injury-free demonstrates care and welfare rather than cruelty or neglect.

The responsibility bestowed upon zoos to prioritize their various roles and activities is a challenge for all zoos regardless of their individual context. Regional analysis of zoo priorities showed little variation for most of the listed activities, and the level of consistency suggests that the findings are valid for zoos in all regions and, as such, the implications and recommendations discussed have the potential to assist zoos around the globe. Zoos are to be commended on prioritizing visitor education, a view consistent with their visitors. However, this research has highlighted that, whilst zoos have changed and evolved over time, zoo visitors’ perceptions and expectations have also evolved and there is a notable disparity between priorities for some key zoo roles and responsibilities that need serious consideration.

The recommendations given in this study are intended to help address these disparities and provide zoos with the opportunity to more accurately cater to visitor needs, whilst further strengthening their position within their communities and fostering sustainable citizenship.

Acknowledgements
Special thanks to all the zoos that participated in this research and to the associations that provided their support, including the International Zoo Educator’s Association, the Canadian
Association of Zoos and Aquariums, the Pan African Association of Zoos and Aquariums, and the European Association of Zoos and Aquariums. Special thanks also to Chapultepec Zoo, Colchester Zoo, Columbus Zoo and Aquarium, Johannesburg Zoo, Loro Parque, Moscow Zoo, Taronga Zoo, Toronto Zoo, and Zoo Negara for their outstanding contribution to this research (these zoos are not listed in site order and written permission was given for acknowledgement).

References
Pearl, K. 1983. What’s a zoo? (For whatever…). Scholastic Update April: 16–19.
Study 3: How do zoos ‘talk’ to their visitors? Do visitors ‘listen’? A mixed methods investigation of the communication between modern zoos and their general visitors.

With an understanding of zoo visitors’ educational agendas and zoos’ education priorities, study three was designed to look into the ways in which zoos provide or deliver education to their visitors. Modern research into communication strategies used within zoos emphasise the importance of using variety to appeal to different audiences and learning styles (Weiler & Smith, 2009).

Study three investigates the tools currently used by zoos to communicate with their visitors. The study incorporates data from the online questionnaire and case study sites to gain a broad view of the types of communication used in zoos today and also the quality of those communications. Also, given that signage is the traditional form of communication between zoos and their visitors, the study aimed to determine visitor engagement with zoo exhibit signage and, if relevant, visitors’ reasons for not reading all exhibit signage during their zoo visit.
Research article
Using evaluation to prove or to improve? An international, mixed method investigation into zoos’ education evaluation practices

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Keywords:
environmental education, programme evaluation, formal zoo education, zoo education

Article history:
Received: 27 February 2014
Accepted: 4 September 2014
Published online: 31 October 2014

Abstract
This study was a mixed-method investigation into zoos’ education evaluation practices. The first phase of the research involved an online questionnaire in which 176 zoos across 48 countries reported their evaluation practices. The second phase comprised nine case studies, enabling direct, in-depth observation of each site within its context, including face-to-face zoo education staff interviews. Taken together, the two phases of this research offer a revealing analysis of current evaluation practice within zoos. The research indicates that zoo education staff understand evaluation and its application within formal zoo education programmes. However, zoo staff noted several barriers to regular evaluation including time, cost and know-how. The majority of case study zoos indicated that their education programmes are guided primarily by school curriculum to be attractive to teachers and link with student learning. The research also suggests that educational programme evaluations in zoos focus mostly on participant satisfaction to ensure teacher expectations are met; educational outcomes for students are rarely addressed. Rather, informal measures including observations and anecdotes are heavily utilised within zoos across all regions, and zoos noted that information gained through formal satisfaction surveys and more informal evaluation processes was used to inform current and future programmes. School return visits and participation rates were also considered important indicators of programme success. However, whilst some case study sites had conducted formal satisfaction surveys, the results had not been analysed or utilised for programme revision or development. Thus, whilst there is a general understanding of evaluation, a strong focus on visitor satisfaction and participation seems to dominate evaluation practice within zoos. There seemed to be little evaluation focused on programme success in terms of the extent to which educational goals are achieved. The implications of these findings and suggestions for future research are discussed.

Introduction
Modern zoos claim to educate their visitors, to promote conservation actions and to actively contribute to environmental education (Patrick et al. 2007). Within the literature three different forms of environmental education, applicable within a zoo setting, are discussed: formal, informal and non-formal. Formal education, the focus of this paper, is generally accepted to include an organised, systematic educational activity with an explicit curriculum that is conducted within an identifiable space, designed for learning, and both the educator and student have clearly identified roles (Coombs 1968; Rogers 2004; Edinburgh Zoo Workshop 2005; World Aquarium and Zoo Association (WAZA) 2005). Within zoos, formal education predominantly serves groups of school children visiting with their teacher, usually with a predetermined purpose (Marshdyole et al. 1982). Informal education, also discussed within this paper, refers to experiences provided to general visitors in the form of species signs, interpretive material, keeper talks and docent or volunteer encounters.

Measuring the success of zoos’ education programmes is important from both zoo’s and teachers’ perspectives. There is a need for classroom teachers to evaluate the effectiveness of zoo visits in relation to student learning (Marshdyole et al. 1982). Gutierrez de White and Jacobson (1994) recommended that zoos incorporate evaluation into programme development to provide a better education product and Hunt (1995) noted the importance of satisfaction surveys and repeat visits as indicators of success.

The methods employed to evaluate zoo education programmes can be appropriately guided by the reasons for the evaluation, for example, programme justification, verification
or development (Edinburgh Zoo Workshop 2005). Additionally, previous research identifies common themes for evaluation practice including determining clear project objectives with measurable results; developing and using consistent language; defining evaluation terms; and addressing the need for contextual understanding of the social, political and cultural aspects relevant to a particular situation (Jacobson 1991; Kleinman et al. 2000; Kim 2003; Stem et al. 2004; Norland and Somers 2006). The approach to evaluation is also significant. Many authors suggest that evaluation is more effective when a coordinated or collaborative approach is taken (Jacobson 1991; Weis 1998; Norland and Somers 2006). In practice, the evaluation of education experiences within zoos needs to be approached systematically and include all stakeholders to ensure the information gained through the evaluation is accurate, valid and reliable (Jacobson 1997).

According to the Edinburgh Zoo Workshop (2005), only one zoo (Bristol Zoo in the United Kingdom) was known to conduct evaluation of their education programmes. When the document “Building a Future for Wildlife – The World Zoo and Aquarium Conservation Strategy” (WAZA 2005) was released in that same year, it was recommended that all zoos produce a written education policy and strategic plan for education. Specifically, the European Association of Zoos and Aquaria education standards were referenced: “the zoo must demonstrate that it is carrying out its education policy, by reference to specific projects, attendance figures, evaluation procedures and research,” (WAZA 2005, p. 36). WAZA (2005) also strongly encourages all zoos and aquariums to use objective and tested methods of evaluating the effectiveness of their conservation education and training programmes” (p. 41). Perhaps understandably, WAZA does not, however, recommend specific evaluation methods or models for use within zoos.

Evaluating formal education programmes should not be beyond the capacity of zoos as they have access to teachers and students prior to, during and following an educational experience. This suggests there are other factors that may influence the use of evaluation in zoos (Hunt 1995; Dierking et al. 2002; Kohl 2004; Kruse and Card 2004; Falk et al. 2007; Vernon and Boyle 2008). Stem et al. (2004) proposed that one of the greatest issues to overcome is the apparent need for each institution to create its own evaluation process. Other factors inhibiting evaluation could include perceived lack of time, associated cost and an absence of expertise within zoos (Gutierrez de White and Jacobson 1994).

Whilst many assumptions have been made, current evaluation practices within zoos have not been fully explored and require further investigation.

There is little argument about the benefits associated with the systematic evaluation of education programmes, whether the purpose is to prove a programme’s worth or to improve its education quality or effectiveness. Within zoos, however, there appears to be a great deal of apprehension when it comes to evaluating formal zoo education. This empirical study seeks a deeper understanding of how zoo conceptualise and consider evaluation whilst also examining current evaluation practices on a global scale. Studying zoo education on a global scale involved an appreciation that each zoo would have different perspectives, objectives, contexts and education implementation processes. To provide the desired depth within the data, mixed methods were used. Gathering both quantitative and qualitative data can help to offset any weaknesses or limitations associated with single method approaches (Denzin 1978; Patton 1990; Tashakkori and Teddlie 1998; McGonigle et al. 2002).

Three research questions are posed in this study:

1. How do zoos think about or conceptualise evaluation?
2. What methods or approaches do zoos use in the evaluation of their formal education programmes?
3. What are the barriers that zoos perceive to use of evaluation?

Method

In this study, data collection was divided into two phases. The first centred on an online questionnaire administered electronically to zoos around the world, to gather data from a large number of zoos within a relatively short period of time. The second phase involved nine in-depth zoo case studies, facilitating direct observation and documentation within each site. Case study research enabled each zoo to be examined within its own context whilst also providing the opportunity for face-to-face interviews with zoo education staff.

Phase 1: Online questionnaire

The online questionnaire consisted of 62 questions, including 20 open-ended, 29 closed response (including five with an open-ended option), 34 rating scale and four multiple choice items. The questionnaire was organised in three sections that included (1) general zoo information, activities and mission statement; (2) types of education provision and its development, implementation and evaluation; and (3) zoo visitors and their perceived educational needs and priorities. Zoos’ responses to section 2 of the questionnaire were used for this paper and focused on zoos’ education provision and its development, implementation and evaluation.

Recruitment to participate in the online questionnaire involved direct email contact and communication with zoo education associations around the world. The list of zoos was obtained from the International Zoo Yearbook (2SL 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. It was not, however, possible to confirm that all email addresses provided in the 2009 Yearbook were correct and it is possible that a number of the 593 zoos were not actually contacted. For this reason, snowball sampling was also used to contact as many zoos as possible. Nevertheless, 167 respondents (95%) to the online survey were those contacted by email using the database provided by the International Zoo Yearbook (2SL 2009).

Zoo recruitment spanned seven months (December 2010 – June 2011). The majority of respondents were education directors or coordinators, zoo directors or education personnel. Table 1 provides a summary of respondents’ positions.

Table 1. Zoo respondents’ position with the zoo (n = 176).

<table>
<thead>
<tr>
<th>Region</th>
<th>Education staff</th>
<th>Director/curator/owner</th>
<th>Vet/keeper/senior staff</th>
<th>Position not specified</th>
<th>Total responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia-Pacific</td>
<td>12 (50%)</td>
<td>2 (8%)</td>
<td>2 (8%)</td>
<td>8 (34%)</td>
<td>24</td>
</tr>
<tr>
<td>Europe, Middle East and Africa</td>
<td>49 (46%)</td>
<td>27 (25%)</td>
<td>6 (6%)</td>
<td>25 (23%)</td>
<td>107</td>
</tr>
<tr>
<td>North and South America</td>
<td>31 (69%)</td>
<td>3 (7%)</td>
<td>1 (2%)</td>
<td>10 (22%)</td>
<td>45</td>
</tr>
<tr>
<td>Totals</td>
<td>92 (52%)</td>
<td>32 (18%)</td>
<td>9 (5%)</td>
<td>43 (25%)</td>
<td>176</td>
</tr>
</tbody>
</table>

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Table 2. Summary of invitations sent, responses received and rates of participation, by geographical region.

<table>
<thead>
<tr>
<th>Region</th>
<th>Invitations sent</th>
<th>Responses</th>
<th>Response rate</th>
<th>Countries with zoo in region</th>
<th>Countries that responded</th>
<th>Case studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asia-Pacific</td>
<td>96</td>
<td>24</td>
<td>25%</td>
<td>16</td>
<td>9 (56%)</td>
<td>2</td>
</tr>
<tr>
<td>2. Europe, Middle East and Africa</td>
<td>327</td>
<td>107</td>
<td>33%</td>
<td>43</td>
<td>32 (75%)</td>
<td>4</td>
</tr>
<tr>
<td>3. North and South America</td>
<td>170</td>
<td>45</td>
<td>26%</td>
<td>13</td>
<td>7 (54%)</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>593</td>
<td>176</td>
<td>30%</td>
<td>72</td>
<td>48 (67%)</td>
<td>9</td>
</tr>
</tbody>
</table>

Zoos within the database were placed into one of three regions, depending on their geographical location (Table 2). To provide a point of comparison it was decided that geographical regions best represented the global nature of the study. It is acknowledged that each region spans a considerable diversity of zoos and cultures.

Phase 2: Nine case studies

During the planning phase of the research three case study sites from each region were proposed. However, given the high number of zoos responding within region 2 and the relatively low number within region 1, two sites were selected from region 1, four from region 2 and three from region 3, providing a total of nine case study sites.

The selection of the case study sites was determined using the following process. All zoos that selected “Yes” or “Maybe” in the questionnaire to participating as a case study site were considered eligible (n = 143, or 82% of respondents). Due to visitor interviews being central to data collection for the case studies a high visitation rate was necessary to provide enough potential participants within a limited time frame. Therefore, all eligible zoos with an annual visitation of 500,000 or more were contacted by email to initiate further discussion. Although this process may have introduced some selection bias into the choice of case study sites, on balance it was more important to maximise the likelihood that sufficient visitor data would be gathered during the week spent at each site. Zoos interested in participating were short-listed as potential sites. Consideration was then given to language (if non-English speaking, was an interpreter to be provided by the zoo) and suitability of the proposed research period for the zoo and its education department. The location of each short-listed zoo was then considered. Ultimately, the nine zoos visited as case study sites included six sites that had English as their primary language (a translator was provided at the remaining three); eight sites with visitation in excess of 1,000,000 per annum; three sites that were private and six that were government-funded; three sites that were among the 10 largest zoos in the world including both the zoo with the highest visitation and the largest zoo in the world (based on land area and the size of the animal collection).

Each case study visit was limited to seven days. The data collection process involved an extensive site analysis to place each zoo within its own context. Data collection methods included contextual observation, a photographic record, visitor interviews, education staff interviews and observation of and participation in special tours. The data used in this paper, in addition to that from the online questionnaire, are derived from zoo education staff interviews.

All sites provided a zoo staff member for each area of education within their zoo. Twenty-eight staff members were interviewed across the nine case study sites. In all cases, the head of education was interviewed and the additional interviewees included area co-ordinators (such as volunteer, school and curriculum) and general educators – typically this accounted for all education staff within each case study site. The interview protocol consisted of 18 questions requiring between 30 minutes and one hour, depending on the respondents’ level of detail. Interview questions included: “Please explain, in your own words, what it means to evaluate an education programme or medium” and “Please explain the process of developing your formal education programmes – for school children”.

All interviews were overtly voice recorded, which reduced the need for transcribing answers during the interviews, ensured the accuracy of data and enabled respondents to answer questions in their own words without being limited to a set writing space.

Data analysis

The qualitative data gathered through the open-ended questions were analysed by first manually coding each response according to its individual characteristics. Using the various codes, the data were then organised into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorised and grouped within themes and no new concepts or themes were evident. To ensure consistency, I conducted all coding and analyses.

Results

Research question 1: How do zoos think about or conceptualise evaluation?

This question investigated how 28 zoo education personnel, from nine case study sites, responded to the prompt: Please explain what it means to evaluate an education programme or medium, during face-to-face interviews. Table 3 summarises their responses.

The data show that zoo education personnel have a substantial understanding of the meaning and application of evaluation. The most frequent response for the first three columns is highlighted in italics. Responses in the final column were, in general, equally represented.

Of the 28 respondents, six provided a relatively generalised or superficial response limited to discussing evaluation as a way of measuring the success of a programme, looking only at the result, for example to “observe a change in the children, they come alive inside”. Twelve of the respondents described evaluation as mainly measuring the success of a programme and also described why evaluation was important, for example “to test how successful you are; to make sure they are receptive and you are providing for their (visitor) needs”. The remaining ten respondents (representing six of the nine case study sites) provided a more comprehensive...
Table 3. Words and phrases used by 28 zoo education personnel to describe what it means to evaluate their education programmes. All responses are represented; the most frequent response is highlighted in italics.

<table>
<thead>
<tr>
<th>Words used to explain evaluation</th>
<th>Evaluation is used to determine if zoo visitors are...</th>
<th>Evaluation is used to determine if the education programme is...</th>
<th>Information gained through evaluation is used to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe</td>
<td>Having their needs met</td>
<td>Successful</td>
<td>Inform programme development</td>
</tr>
<tr>
<td>Measure</td>
<td>Engaged</td>
<td>Achieving its goals</td>
<td>Refine the programme</td>
</tr>
<tr>
<td>Gauge</td>
<td>Receiving messages</td>
<td>Achieving its objectives</td>
<td>Justify education programmes</td>
</tr>
<tr>
<td>Test</td>
<td>Understanding the messages</td>
<td>Relevant</td>
<td>Determine if objectives have been met</td>
</tr>
<tr>
<td>Question</td>
<td>Being influenced by the messages</td>
<td></td>
<td>Determine if goals have been met</td>
</tr>
<tr>
<td>Determine</td>
<td>Having their expectations met</td>
<td></td>
<td>Give the educator a sense of satisfaction</td>
</tr>
<tr>
<td>Assess</td>
<td>Listening</td>
<td></td>
<td>Improve programme delivery</td>
</tr>
</tbody>
</table>

The data show that, on average, 95% of responding zoos determine objectives for their formal and/or informal education programmes at least sometimes and only 5%, typically, do not. When analysed regionally, 100% of zoos within region 3 (North and South America) and 98% of zoos within region 2 (Europe, Middle East and Africa) determine objectives at least sometimes. This is in contrast to zoos in region 1 (Asia, Pacific) of which 12% (3 zoos) reported that objectives are typically not determined for their educational programming. Of the zoos that do determine objectives for their formal and/or informal educational experiences, Figure 2 summarises the response to a closed three-option (yes, sometimes or no) item asking “are there any measures used to assess whether those specific objectives have been met?”

The data show that on average, 80% of responding zoos use measures to determine the success of their educational programmes at least sometimes and 20% do not use such measures. Ninety-one percent of region 1 (Asia–Pacific) zoos reported using measures at least sometimes, a rate followed closely by region 3 zoos (North and South America, 89%). Considerably fewer region 2 (Europe, Middle East and Africa) zoos reported use of measures in determining the success of their educational offerings (73%). Respondents to the online questionnaire were also asked to detail the types of measures they used to determine the effectiveness of their formal and/or informal education programmes in relation to specific learning objectives. Figure 3 summarises zoos’ responses. Responding zoos most frequently use questionnaires to measure the extent to which their educational objectives are achieved.

Figure 1. Percentage of zoos that determine specific objectives for their education programmes (n = 176).

Figure 2. Percentage of zoos that use measures to determine if their specific formal and/or informal educational objectives have been met (n = 167).
Figure 3. Types of measures used to determine if formal and informal educational objectives had been achieved. Note: 119 zoos gave 160 responses, so the above figures equate to more than 100.

Figure 4. Percentage of zoos that collect information from teachers or students after a formal education experience at the zoo (n = 176).

accounting for the top three responses (Figure 3). Internal discussion, external evaluation and rates of participation comprise the least used types of measure with 5-6% of respondents utilising at least one of these measures. It is interesting to note that 9% of zoos noted “evaluation” as a measure but did not provide any information to enable further analysis.

Equipped with an understanding of zoos’ general approach to evaluation it became important to understand how zoos evaluate their formal education programmes, programmes offered to school children. Figure 4 summarises the response to a closed, three-option (yes, sometimes and no) item within the online questionnaire, asking zoos if they collect information from teachers or students after an education programme visit.

The data show that on average 93% of zoos collect information from teachers and/or students at least some of the time. All zoos within region 1 (Asia–Pacific) reported that they collect this type of information, with more than two-thirds noting a “yes” response. Zoos within region 2 (Europe, Middle East and Africa)

Figure 5. List of measures zoos report using to evaluate their formal school education programmes and percentage of zoos using those measures (n = 157).
from teachers and/or students" (13% and 8%, respectively). The remaining measures are poorly represented with averages of 3% or less.

Regional analysis indicated only a small difference between regions that report using "programme content surveys": Region 3 zoos (North and South America) reported the highest use at 52%. For use of "satisfaction surveys", there was a 12% regional difference; slightly less than 40% of zoos in Europe, Middle East and Africa and zoos in North and South America reported using these surveys, as compared to half of the zoos in Asia-Pacific.

Of the remaining measures, regional analysis shows that zoos within region 1 report actively seeking "teacher suggestions for future programmes" at a higher rate (21%) than zoos within regions 2 (11%) and 3 (14%). Zoos within region 2 more frequently report using "verbal feedback from teachers and/or students" (13%), where as (9%) of zoos within region 3 use "class characteristics" as a measure. It is also interesting to note that only one zoo, among 157 respondents, reported testing of students prior to and following a formal education experience to measure the success of its educational programme.

Given this understanding of what types of information are collected by zoos, it became important to understand what zoo education staff do with that information. Figure 6 summarises zoos' responses to an open item asking about what zoos do with the data they have gathered to adapt or alter their formal education programmes.

The data show that more than half the responding zoos (56%) use data gained through the various measures to adapt or inform their current formal education programmes and a quarter of zoos report using the information to inform future programmes. Importantly, the analysis also showed that a relatively large percentage (16%) of zoos report that they either use the information to examine current programmes, but do not take any action, or do not use the information at all.

To further enhance our understanding of evaluation practices within zoos, 28 zoo education personnel within the nine case study zoos were asked to explain the process of developing their evaluation practices.

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**Table 4. Summary of formal zoo education programme development and evaluation considerations reported by 28 zoo educators from nine case study sites.**

<table>
<thead>
<tr>
<th>Education programme development</th>
<th>Frequency of evaluation</th>
<th>Measures</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td><strong>Are goals determined?</strong></td>
<td><strong>N/A</strong></td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>Site 1 Specific needs basis</td>
<td>None</td>
<td>Rarely</td>
<td>N/A</td>
</tr>
<tr>
<td>Site 2 Curriculum</td>
<td>None</td>
<td>Always</td>
<td>N/A</td>
</tr>
<tr>
<td>Site 3 Zoo site priorities</td>
<td>Yes</td>
<td>Periodically</td>
<td>Refinement</td>
</tr>
<tr>
<td>Site 4 Curriculum and revenue source</td>
<td>Yes</td>
<td>Funded – always (other rarely)</td>
<td>Justification and refinement</td>
</tr>
<tr>
<td>Site 5 Curriculum</td>
<td>Yes</td>
<td>Always</td>
<td>Not used</td>
</tr>
<tr>
<td>Site 6 Curriculum</td>
<td>Yes</td>
<td>Always</td>
<td>Satisfaction</td>
</tr>
<tr>
<td>Site 7 Curriculum</td>
<td>Yes</td>
<td>Always</td>
<td>Refinement</td>
</tr>
<tr>
<td>Site 8 Curriculum</td>
<td>Yes – visit specific</td>
<td>Periodically</td>
<td>Not used</td>
</tr>
<tr>
<td>Site 9 Curriculum</td>
<td>None</td>
<td>Periodically</td>
<td>Reporting for Zoo Board</td>
</tr>
</tbody>
</table>

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**Journal of Zoo and Aquarium Research 2(4) 2014**
formal education programmes, including evaluation practices. Table 4 summarises these responses, and shows that the majority of sites (78%) develop their education programmes within the context of the local school curriculum. One site reported developing programmes on the basis of visitor needs. Further analysis revealed that this zoo developed specific programmes for children with special needs including children with blindness and deafness. Another case study zoo reported that its education programmes were developed according to its own educational priorities. Further analysis of this response revealed that formal education programmes were linked to the current conservation work conducted within the zoo with the intention of giving students a “connection” to conservation efforts and the natural environment.

As indicated above, analysis of the online questionnaire showed that 57% of zoos reported that they determined specific objectives for their education experience (see Figure 1). Whilst this related to both formal and informal education, it is interesting to note that 67% of the case study sites also reported determining specific objectives or goals for their formal programmes. This consistency was also observed within the reported frequency of practising evaluation. The questionnaire data revealed that 53% of responding zoos collected data from teachers and/or students at least some of the time. This is relatively consistent with the 100% response from case study interviewees, who stated that they evaluate their programmes. It is important to note, however, that two of the case study sites reported that they “rarely” evaluate their programmes, three reported periodic evaluation and four zoos reported that they always evaluate their education programmes.

The measures reported by case study respondents, listed within Table 4, are mostly consistent with the measures reported by zoos within the online questionnaire (Figure 3). One case study site reported using a pilot study to determine the effectiveness of a new programme but this was not reported by this zoo within the online questionnaire.

The online questionnaire revealed that about half of zoos reported using the information gained through evaluation measures to adapt or refine their education programmes. This was also relatively consistent with the 44% who reported the same within the case study interview data.

Within the online questionnaire, a small number of zoos (n = 16) indicated that they did not collect data from teachers or students following a formal education visit. Figure 7 summarises these zoos’ responses to an open question asking how they determine the value of a zoo visit from teachers’ or students’ perspectives.

The data show that nearly half (44%) of the responding zoos measure the success of their education programmes through informal conversations and more than a third (37%) consider repeat visits and participation rates a measure of educational programme success. Three zoos reported that they self-assess their educational success but did not provide any further detail.

**Research question 3: What are the barriers that zoos perceive to their use of evaluation?**

This question investigated the issues and concerns raised by zoo educators in relation to evaluation and its use within their zoo. These data are taken from zoo education staff interviews at the nine case study sites (n = 28). Zoo educators were not directly asked to discuss the barriers or problems associated with education programme evaluation in their zoo. Rather, the following comments were made by respondents about evaluation at some point during the interview process and are listed in descending frequency.

- “Time consuming”
- “Need more staff”
- “Expensive”
- “Hard to do”
- “Haven’t worked out how to do it” (relating to the evaluation of exhibit signage)
- “When formal evaluations are received Iilter the information and only share the positive messages to avoid disappointment.”

The data show that the primary barrier perceived by responding zoo educators is that evaluation is a time-consuming activity. When placed within the context of their interview, zoo educators emphasise how busy they are, the lack of funding and the need for more staff.

**Discussion**

This study aimed to provide an overview of evaluation practices within modern zoos, specifically focusing on the evaluation of formal education programmes. Through staff interviews, this research examined how zoos think about or conceptualise evaluation within the context of zoo education. With the addition of information gained through an online questionnaire, the research investigated how zoos apply evaluation processes to their formal education programmes.

One of the key factors to consider when investigating the utilisation of an evaluation approach is the reason or purpose of that evaluation. Stufflebeam (2001) identified 22 different approaches to evaluation, some that focus on “proving” a programme’s value or worth and others that focus on programme improvement. The three reasons for evaluating zoo education given by the Edinburgh Zoo Workshop (2005) were justification, verification and development. The results from this research show that whilst zoo education staff across all regions have a general understanding of evaluation and its application, the primary purpose for evaluation as practised within zoos is to prove or justify a programme’s worth. Half of the responding zoos also recognise their ability to improve their educational offerings via evaluation (see Figure 6). However, the measures used, which include satisfaction surveys, conversations and participation rates (see Table 4), are not likely to provide sufficiently detailed or accurate information for education programme improvement.

The research shows that zoo education programmes are most typically developed to align with school curriculum standards. Consequently, the goals determined to measure success relate to teacher satisfaction, rather than student learning. It is encouraging to learn that the majority of responding zoos collect data from teachers and/or students at least some of the time. However, with
the exception of surveys, much of these data are in the form of informal conversation or anecdotes. There is little evidence that zoos from any region evaluate their educational value from the perspective of student learning for the purpose of programme improvement or development.

Within the literature, authors discuss the need to have a holistic, systematic approach to evaluation and to involve all stakeholders (Hunt 1995; Jacobson 1997). Gutierrez de White and Jacobson (1994) emphasise the need for evaluation being incorporated into the whole process from educational programme development to post-provision. The data show that the majority of responding zoos incorporate aspects of evaluation into their programmes during development, including the determination of specific objectives and use of data collection measures. However, the use of evaluation findings was limited, and possibly underused by zoo educators. Evaluation served as a tool for proving rather than for improving. Whilst this research reveals that zoos currently focus on measuring satisfaction, the data also show that zoos have the potential to evaluate the educational value of their programmes, demonstrated by the high percentage of zoos that already determine objectives and incorporate measures and by the considerable understanding of zoo education staff about programme evaluation.

In 2005, WAZA encouraged zoos to evaluate the effectiveness of their conservation education programmes and while this research indicates that zoos are not yet achieving this goal, it does show that zoos have actively implemented evaluation strategies for other purposes or perhaps without a clear purpose. If the intention was for zoos to measure their educational impact for the purpose of programme improvement it becomes important to understand why this is not happening. The perceived barriers to programme evaluation, identified by zoo education staff, were consistent with those listed by Gutierrez de White and Jacobson (1994) and included issues relating to time, cost and know-how. Another possible barrier highlighted by the research is the concern expressed about sharing less than positive evaluation results. Although further research could help refine understanding of why zoos are not currently evaluating for the purpose of programme improvement, we feel that zoos would benefit more immediately from the systematic provision of guidance.

Given the findings within this study, we suggest that governing associations, including WAZA, collaborate with zoos and aquariums to develop professional standards, specifically relating to evaluation practices. If the intention of evaluating education programmes within zoos is to improve the value of their offerings, then clear guidelines need to be established to assist zoos in implementing these practices. An evaluation model specifically designed for zoos would also be beneficial. For example, Stufflebeam’s (2001) Decision/Accountability family of evaluation approaches may provide zoos and zoo associations with an appropriate base for model development. Equipped with clear and specific guidelines zoos would then be in a better position to collaborate with other stakeholders, an important consideration raised by several authors including Jacobson (1991), Weiss (1998) and Norland and Sorners (2006). In addition, once equipped with such a model, zoos could seek and encourage collaboration with classroom teachers (Marshdoyle et al. 1982) to further refine the model for specific purposes including providing evidence of satisfaction and information directly from students that could be used to improve the zoo’s educational value – evaluation to improve as well as to prove.

Sound educational practices involve a dedication to collaboration and continual programme development for the improvement of student learning. Sound evaluation can provide zoos with a toolbox of processes and strategies to systematically gauge their educational success. The provision of evaluation guidelines, including clearly defined purposes, will provide zoos with the opportunity to use those tools in ways that strengthen their educational capacity at the forefront of conservation education.

Acknowledgements

Special thanks to all the zoos that participated in this research and to the associations that provided their support including the International Zoo Educator’s Association, the Canadian Association of Zoos and Aquariums, the Pan African Association of Zoos and Aquariums and the European Associations of Zoos and Aquariums. Special thanks also to Chapultepec Zoo, Colchester Zoo, Columbus Zoo and Aquarium, Johannesburg Zoo, Loro Parque, Moscow Zoo, Taronga Zoo, Toronto Zoo and Zoo Negara for their outstanding contribution to this research (these zoos are not listed in site order and written permission was given for acknowledgement).

References


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Study 4: Using evaluation to prove or to improve? An international, mixed method investigation into zoos’ formal education.

Equipped with an improved understanding of visitor intentions, the roles of zoos in modern society and the types of communication used by zoos to deliver education to their visitors, study four was designed to determine how zoos gauge the success of their educational provision. Many zoos claim to educate their visitors and although researchers acknowledge that zoos are in an ideal position to educate the community, there is little research to corroborate the level of educational success being claimed by zoos. As the burden of proof lies with zoos (Moss & Esson, 2013), zoos’ governing associations encourage zoos to use educational program evaluation as a means of proving and improving education provision.

Study four investigates zoos’ formal education evaluation practices. The study examines how zoo staff conceptualise evaluation and the approaches used to measure or evaluate their education programs and also how that information is used. Through face-to-face interviews, the study also sought to understand perceived barriers associated with the process of evaluation.

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Abstract
Modern zoos utilise a variety of education tools for communicating with visitors. Previous research has discussed the benefits of providing multiple education communications, yet little research provides an indication of what communications are being employed within zoos today. This research is a two-phased, mixed-methods investigation into the communication between zoos and their general visitors. Phase 1 involved an online questionnaire to which 176 zoos from 50 countries reported on the types of education communications they typically use for their general visitors. The second phase comprised nine zoo case studies, enabling direct observation and face-to-face interviews on site with zoo staff and zoo visitors. The findings of this research provide a snapshot of education communications offered to zoo visitors, and indicate that zoo exhibit signage remains the most prevalent medium. The findings further indicate that 95% of visitors read at least some exhibit signs and that more than 70% of participating zoos utilise person-to-person education. The implications of these findings for improving zoos’ educational communication are discussed.

Considering our present ecological situation, environmental education is a pertinent tool for addressing environmental change and encouraging sustainable living (Hungerford & Volk, 1990; Keen, 1991; Newhouse, 1990; Patrick, Matthews, Ayres, & Tunncliffe, 2007). Zoos receive hundreds of millions of visitors each year (Smith, 2013; World Aquarium and Zoo Association [WAZA], 2012) and are typically located within densely populated areas (Packer & Ballantyne, 2010). Given these visitation rates and accessible locations, zoos are a valuable resource, ideally positioned to provide conservation and environmental education to large groups of people (Gutiérrez de White & Jacobson, 1994; Hancocks, 2001; Miller et al., 2004; Patrick et al., 2007). However, offering conservation education to such a broad range of people with different entering motivations and personal identities does not necessarily mean that they will engage with the messages being provided (Falk, 2006; Fraser & Sickler, 2008; Morgan & Hodgkinson, 1998; Sommer, 1972).

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Within their mission statements, zoos around the globe claim to educate their visitors by promoting conservation action and encouraging visitors to actively contribute to environmental action (Patrick et al., 2007). To determine the validity of these claims, it is important to understand the zoo experience, both from the visitor’s perspective and in terms of zoo’s ability to engage visitors via the various educational communications experienced during zoo visits. In short, it seems necessary to understand what types of communications zoos are using today to ‘talk’ to their visitors and in what ways their visitors ‘listen’.

It is well documented that people visit zoos for different reasons (Dierking, Burtynyk, Buchner, & Falk, 2002; Falk et al., 2007; Kellert, 1978; Kohl, 2004; O’Connor, 2010; Peart, 1993; Vernon & Boyle, 2008). Falk (2006) proposed that visitors may be: explorers, facilitators, experience seekers, professional hobbyists or spiritual pilgrims. Vernon and Boyle’s (2008) research expanded on Falk’s identity-related motivations and found that while most visitors gave multiple identity-related reasons for their visit, almost half gave a single, dominant reason. These authors suggested that zoos explore this further to ensure they offer ‘multiple layers of experiences to appeal to the broad array of visitor motivations’ (Vernon & Boyle, 2008, p. 9).

Historically, zoos provided visitors with information about animals via a species, or taxonomic sign. Then, during the mid-20th century, to complement the development of naturalistic enclosures, zoos explored the use of interactive educational experiences and basic forms of electronic media, such as push button audio (Anderson, 2003; Peart, 1993; Smith & Brod, 2008). This led to the development of immersive exhibits, which enabled visitors to ‘enter’ an enclosure and be surrounded by the plants and animals on display (Anderson, 2003; Coe, 1994; Smith & Brod, 2008). Enhanced by soundscapes, lighting, weather effects and sensory stimulation (Larsen, 2002), these holistic environments were designed to motivate visitors into reading signs and learning about the creatures within the exhibit (Anderson, 2003; Coe, 1994; Smith & Brod, 2008). Larsen’s (2002) research, however, showed that many visitors did not make the connection between the landscape environment and the animals, highlighting the need for interpretive staff or more effective signage.

More recently, some zoos have invested in purpose-built discovery centres where general visitors, particularly family groups, could touch, observe and ask questions about the animals (White & Marcellini, 1986). Interpretive graphic signs were also created to appeal to family groups, tapping into visitor curiosity, encouraging discussion and free choice learning (Anderson, 2003). Anderson (2003) discussed two successful models employed for interpretive graphic signs: the first type provided answers for anticipated questions (such as Why do monkeys have purple bottoms?) and the second provided information about a behaviour that could be observed by visitors (such as monkeys grooming each other).

Although interpretive graphics catered for family groups, Wineman, Piper, and Maple (1996) noted the lack of attractions or activities within zoos catering for young and teenage children, concluding that zoos needed to provide opportunities for these age groups to explore and discover. Wagner (2002) discussed the importance of technology-based education and interpretation, which could appeal to teenage audiences. Wineman et al. (1996), however, contended that zoos should avoid using technology and focus on being a real experience. Whatever one’s position on this issue, the exponential rise in popularity and access to smartphones and tablets would seem to provide zoos with additional opportunities to engage in environmental and conservation education with their audiences.

Another means of communication within zoos is live interpretation, including keeper talks, docents and guided tours. Research suggests face-to-face communication
can both entertain and facilitate a personal connection with the animals on display, potentially enhancing conservation messages given by the zoo’s presenter (Anderson, Kelling, Pressey-Keough, Bloomsmit, & Maple, 2003; Falk et al., 2007; O’Connor, 2010; Packer & Ballantyne, 2010; Swanagan, 2000; Vernon & Boyle, 2003; Wagner, 2002). Research also suggests, however, that the quality and value of live interpretation can be influenced by the level of animal activity, the use of drama and theatrical entertainment, and the skills of the presenter (Anderson et al., 2003; Hungerford & Volk, 1990; Kellert, 2000; Monroe, 2003; O’Connor, 2010; Swanagan, 2000). Bramley (1992) discussed the importance of humour and its ability to relax zoo visitors, giving them an enjoyable experience and facilitating their receptivity to learning. Bramley also posited that visitors who have an enjoyable time will come back more often, giving zoos the opportunity to have a greater, cumulative educational impact.

Thus, research has suggested that the provision of a variety of communications would appeal to a greater proportion of visitors, encouraging them to engage in free-choice learning (De Herder & Streiter, 2010; Falk, 2006; Fraser and Sickler, 2008; Kolm-Olssan, 2005; Morgan & Hodgkinson, 1996; Packer & Ballantyne, 2010; Sommer, 1972). Consequently, in 2005, the World Zoo and Aquarium Conservation Strategy (WAZA, 2005) was produced to provide zoos with a set of guidelines, including recommendations for education. The strategy states that zoos are to provide a range of experiences, materials and resources for the diversity of visitors’ (WAZA, 2005, p. 37).

More than 30 years ago, Van Den Brink (1981) claimed that despite the development and growth of new and varied educational techniques, the basic biological and taxonomic species sign was the only source of information provided to the majority of zoo visitors. Today, to varying degrees, zoos have a wealth of resources and new technologies to expand the reach of their conservation messages beyond traditional species signs. These could be achieved through interactive and immersive interpretation, feeding demonstrations, keeper talks, docents, guided tours and technology (Anderson, 2003; Serrell, 1981a). Until recently there has been very little research investigating the benefits of offering multiple layers of interpretation to zoo visitors (Weiler & Smith, 2009). Weiler and Smith’s (2009) research concluded that ‘no individual interpretive medium performed better in terms of any of the ten indicators of visitor cognitive, affective and behavioural outcomes’ (p. 102). While they were unable to recommend one communication type over another, Weiler and Smith’s (2009) research supported the view that the more types of education communications provided to zoo visitors, the greater the impact on visitor learning. So, what types of communication do zoos use today to ‘talk’ to their visitors? Are signs still the predominant medium?

To provide empirical answers to these questions, this research examines the self-reported types of education communications offered at 176 zoos across 50 countries, providing a systematic analysis of the different types currently used to educate general visitors within zoo contexts on a global scale. The study then compares zoo’s self-reported types of education communications against those directly observed within nine case study sites. Additionally, within case studies, this research also examines zoo visitors’ viewing of exhibit signage, historically the most prevalent education medium within zoos. Three research questions are posed in this study:

1. What types of education communications do today’s zoos report offering their general visitors?
2. How do zoos’ self-reported types of education communications compare to the communications observed at nine case study sites?
3. To what level do general visitors view exhibit signage?
Method

The research questions examined within this article, which focus on the types of education communication available to general zoo visitors, have been derived within the context of a larger mixed-methods study into zoo education and the processes modern zoos use to understand and improve their educational provision.

Data collection was divided into two phases. The first centred on an online questionnaire administered electronically to zoos around the world, to gather data from a large number of zoos within a relatively short period of time. The second phase involved nine in-depth zoo case studies, facilitating direct observation and documentation within each site. Case study research enabled each zoo to be examined within its own context while also providing the opportunity for face-to-face interviews with zoo staff and zoo visitors. Selected data from both phases have been analysed for this article.

Studying zoo education on a global scale involved an appreciation that each zoo would have different perspectives, objectives, contexts and education implementation processes. To provide the desired accuracy and depth within the data, a mixed methods research approach was used. Utilising both quantitative and qualitative data collection methods can help to offset any weaknesses or limitations associated with single method approaches. Denzin (1978) and Patton (1990) have identified the combination of quantitative and qualitative methods as fundamental in the process of triangulation: the process of testing consistency and corroborating findings through the use of different methods. This view was extended by Johnson and Onwuegbuzie (2004) and Tashakkori and Teddlie (1998), who suggest that using mixed method approaches can work to address any potential weaknesses that may be inherent in a single method.

Green, Caracelli, and Graham (1986) have also argued that mixed methods enable expansion and elaboration, provide added depth, richness and detail to a study, and may uncover new insights into participant experiences. McConney et al. (2002) have noted the increasing trend among researchers and evaluators towards using whatever type of data or method best answers research questions.

Despite the considerable scope of the study, reflected by the participation of 176 zoos across 50 countries, it nevertheless is recognised that participation in both the online survey and case studies was completely voluntary for zoos and their staff. This feature of the study’s design means that the findings and their generalisability to all zoos is limited.

Phase 1: Online Questionnaire

The online questionnaire consisted of 62 questions, including 20 open-ended, 29 closed responses, 14 rating scale and 4 multiple choice items. The questions were generated using previous research literature that addressed similar issues, while maintaining focus on generating data to answer the research questions within the project. This approach to question development was important for ensuring the alignment, and hence the content-related validity of the instrument used. The questionnaire was organised in three sections that included: (1) general zoo information, activities and mission statement; (2) types of education provision and its development, implementation and evaluation; and (3) zoo visitors and their perceived educational needs and priorities. Section 2 of the questionnaire, zoos’ education provision, forms the focus of this article. Additional aspects of the larger study that address zoos’ roles and priorities and zoos’ use of educational program evaluation, may be found in Roe and McConney (2014) and Roe, McConney, and Mansfield (2014a, 2014b), respectively.

Recruitment to participate in the online questionnaire involved direct email contact and contact through various zoo education associations around the world. The contact
TABLE 1: Zoo Respondents’ Position With the Zoo (n = 176)

<table>
<thead>
<tr>
<th>Region</th>
<th>Education staff</th>
<th>Director/curator/owner</th>
<th>Vet/keeper/senior staff</th>
<th>Position not specified</th>
<th>Total responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asia-Pacific</td>
<td>12 (50%)</td>
<td>2 (8%)</td>
<td>2 (8%)</td>
<td>8 (34%)</td>
<td>24</td>
</tr>
<tr>
<td>2. Europe, Middle East and Africa</td>
<td>49 (46%)</td>
<td>27 (25%)</td>
<td>6 (6%)</td>
<td>25 (23%)</td>
<td>107</td>
</tr>
<tr>
<td>3. North and South America</td>
<td>31 (69%)</td>
<td>3 (7%)</td>
<td>1 (2%)</td>
<td>10 (22%)</td>
<td>45</td>
</tr>
<tr>
<td>Totals</td>
<td>92 (52%)</td>
<td>32 (18%)</td>
<td>9 (5%)</td>
<td>43 (25%)</td>
<td>176</td>
</tr>
</tbody>
</table>

List of zoos was obtained from the International Zoo Yearbook (Zoological Society of London [ZSL], 2009). A total of 593 zoos open to the public, representing 72 countries, comprised the database. It was not, however, possible to confirm that all email addresses provided in the 2009 Yearbook were correct and it is possible that a number of the 593 zoos were not actually contacted. This is particularly so for zoos in India, Japan and Germany from where 54 (9%) email invitations were returned as undeliverable. For this reason, snowball sampling was also used to contact as many zoos as possible. Nevertheless, the majority of respondents (95%) were those contacted by email using the database provided by the International Zoo Yearbook (ZSL, 2009).

To initiate snowball sampling, several zoo educators were contacted directly by email or telephone and invited to participate in the study. With their support, details of the research project were printed in the International Zoo Educators Newsletter (International Zoo Educators Association [IZE], 2011) stating the IZE’s support for the research. All international zoo associations were also contacted, resulting in the Canadian Association of Zoos and Aquariums and the Pan African Association of Zoos and Aquariums emailing their members requesting their participation. The European Association of Zoos and Aquariums also offered its support of the research.

Zoo recruitment spanned 7 months (December 2010–June 2011). The majority of respondents were education directors or coordinators, zoo directors or education personnel; Table 1 provides a summary of respondents’ positions.

Zoos within the database were placed into one of three regions, depending on their geographical location (Table 2). To provide a point of comparison it was decided that geographical regions best represented the global nature of the study. It is acknowledged that each region spans a considerable diversity of zoos and cultures.

Phase 2: Nine Case Studies

During the planning phase of the research, three case study sites from each region were proposed. However, given the high number of zoos responding within region 2 and the relatively low number within region 1, two sites were selected from region 1, four from region 2 and three from region 3, providing a total of nine case study sites.

The selection of the case study sites was determined using the following process. All zoos that selected ‘Yes’ or ‘Maybe’ (in the questionnaire) to participating as a case study site were considered eligible (n = 143, or 82% of respondents). Due to visitor interviews being central to data collection for the case studies, a high visitation rate was necessary to provide enough potential participants within a limited time frame. Therefore, all eligible zoos with an annual visitation of 500,000 or more were contacted.
by email to initiate further discussion. Although this process may have introduced some selection bias into the choice of case study sites, on balance it was more important to maximise the likelihood that sufficient visitor data would be gathered during the week spent at each site. Zoos interested in participating were shortlisted as potential sites. Consideration was then given to: language (if non-English speaking, was an interpreter to be provided by the zoo?); and suitability of the proposed research period for the zoo and its education department. The location of each shortlisted zoo was then considered. Ultimately, the nine zoos visited as case study sites included: six sites that have English as their primary language (a translator was provided for the remaining three); eight sites with visitation in excess of 1,000,000 per annum; three sites that are private and six that are government-funded; and three sites among the ten largest zoos in the world, including both the zoo with the highest visitation and the largest zoo in the world (based on land area and the size of the animal collection).

Each case study visit was limited to 7 days. The data collection process involved an extensive site analysis to place each zoo within its own context. Data collection methods included: contextual observation and an extensive photographic record, both of which were guided by a predetermined checklist; visitor interviews; education staff interviews; and observation of and participation in special tours. The first author conducted all data collection. The data used in this article, in addition to that from the online questionnaire, are derived from direct observation, photographic records, zoo staff, and zoo visitor interviews.

Twenty-eight staff members were interviewed across the nine case study sites. In all cases, the head of education was interviewed and at two sites the zoo directors were also interviewed. The remaining interviewees included area coordinators (such as volunteer, school and curriculum) and general educators — typically, this accounted for all education staff within each case study site. The interview protocol consisted of 18 questions requiring between 30 minutes and 1 hour, depending on the respondents' level of detail.

Sixty general zoo visitors were interviewed at each of the nine case study sites, resulting in a total of 540 interviews. Clearly, the duration of each site visit limited the number of visitor interviews conducted, and we readily acknowledge that
60 interviews, even though recruited at random during site visits, limits the generalisability of visitors’ responses to all those possible at any zoo. An important purpose in conducting visitor interviews, however, was to gather a rich mix of qualitative and quantitative data that together afforded us deeper (rather than broader) insight into visitors’ views and intentions.

Visitors were recruited deep within each zoo, maximising the likelihood that the respondents had seen at least some of the exhibits prior to being interviewed. Focal sampling, with a continual ask, was employed to interview visitors over 18 years of age. Each zoo visitor interview took approximately 5 minutes. The focus of the visitor interview included pre-visit information, such as why they came to the zoo, participation in activities within the zoo, the importance of zoo activities, behaviour relating to animal visibility and reading signage, educational needs and preferred delivery, and their day’s highlight. The section of the visitor interview used for this article focused on visitors’ reading of signage. Visitors were asked how many signs they had read at the animal enclosures, choosing from five scaled options (all, most, half, some, none). With the exception of visitors who reported reading all the signs, visitors were then asked: ‘If you didn’t read all or any of the signs, why not?’ All interviews were overtly voice recorded, which reduced the need for transcription during the interviews, ensured the accuracy of data, and enabled respondents to answer questions in their own words without being limited to a set writing space. The participation rate was very high, above 80%. A summary of participants’ age and gender is shown in Figure 1.

**Data Analysis**

For both the online questionnaire and case study interviews, quantitative data were analysed using MS Excel, enabling statistical and graphical comparisons to be made. For example, chi square tests were used to determine statistical significance between regions. The qualitative data gathered through the open-ended questions were
analysed by first manually coding each response according to its individual characteristics. Using the various codes, the data were then organised into main themes identified in the responses, which in turn led to identification of response patterns or trends. This iterative process was continued until all responses had been examined, coded, categorised and grouped within themes and no new concepts or themes were evident. To ensure consistency, the first author conducted all coding and analyses.

Definition of Terms

Signs (at animal enclosures) refer to taxonomic species information as well as interpretive signage.

Education communications refer to any form of communication offered by zoos to their general visitors for the purpose of education, including but not limited to: taxonomic species signs; interpretive signs; interactive exhibits, modules or signs; verbal presentations, shows and displays; tours and docents; printed material such as maps, brochures or pamphlets; digital media including television screens and cinemas; audio, including soundscapes or recorded messages.

Findings

Questionnaire and case study data have been analysed to answer the three research questions posed in this article. The analysis provides insight into the current types of education communications used within zoos and zoo visitors’ interaction with exhibit signage.

Research Question 1: What Types of Education Communications Do Today’s Zoos Report Offering Their General Visitors?

Research question 1 investigates the self-reported types of education communications of zoos; the data are derived from seven questions within the online questionnaire to which 176 zoos responded. The first question focused on printed media, and zoos were asked to select those used within their zoo; multiple selections were permitted and options included: signs at animal enclosures, pamphlets/brochures, and worksheets. Zoos were then provided with a list of educational activities and asked whether or not those activities were available or used within their zoo. The activities listed were: animal feeding demonstrations with verbal presentation, zookeeper talks (other than animal feeding demonstrations), animal shows (such as bird of prey free flight demonstration), animal contact area (where visitors can touch or interact with animals), docents (volunteer tour guides/guides/hostesses). Table 3 summarises zoos’ responses.

The data show that 97% of the respondents use signs as an education communication within their zoo, 72.5% report using pamphlets and 68.5% use worksheets. Three per cent reported that they do not use signs and 1.5% noted that they do not use any signs, brochures, pamphlets or worksheets.

When analysed regionally, a large proportion (62%) of zoos within region 2 (Europe, Middle East and Africa) use all three: signs, pamphlets and worksheets. By comparison, only 35% of zoos within region 1 (Asia-Pacific) and 39% in region 3 (North and South America) use all three. A greater proportion of zoos within region 1 (26%) and region 3 (23%) use signs and pamphlets only, indicating that fewer zoos within these regions use worksheets as an education communication for the general public. It should be noted, however, that neither of these differences were significant. $\chi^2 = 4.34$, $df = 4$, $p > .05$; $\chi^2 = 2.09$, $df = 4$, $p > .05$. A significant difference was found in the number of responding zoos reporting the use of signs only. Twenty-three per cent of the zoos within region 3
TABLE 3: Self Reported Types of Education Communications Utilised Within Responding Zoos

<table>
<thead>
<tr>
<th>Communication type</th>
<th>Average</th>
<th>Region 1: Asia-Pacific</th>
<th>Region 2: Europe, Middle East and Africa</th>
<th>Region 3: North and South America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs, pamphlets and worksheets</td>
<td>63</td>
<td>35</td>
<td>62</td>
<td>39</td>
</tr>
<tr>
<td>Signs and pamphlets only</td>
<td>18</td>
<td>26</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Signs and worksheets only</td>
<td>15</td>
<td>22</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Signs only</td>
<td>11</td>
<td>17</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Pamphlets and worksheets only</td>
<td>1.5</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>No signs or pamphlets or worksheets</td>
<td>1.5</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Animal feeding with verbal presentation</td>
<td>83</td>
<td>87</td>
<td>79</td>
<td>91</td>
</tr>
<tr>
<td>Zoo keeper talks</td>
<td>74</td>
<td>87</td>
<td>67</td>
<td>82</td>
</tr>
<tr>
<td>Animal shows</td>
<td>54</td>
<td>54</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>Animal contact area</td>
<td>78</td>
<td>58</td>
<td>78</td>
<td>87</td>
</tr>
<tr>
<td>Docents/guides/volunteers</td>
<td>75</td>
<td>83</td>
<td>70</td>
<td>82</td>
</tr>
</tbody>
</table>

Note: N = 176. Values are given as a percentage.

use signs only, more than double the average (11%) and nearly five times the percentage of zoos within region 2, \( \chi^2 = 10.20, df = 4, p < .05. \)

On average, more than 95% (172) of the zoos participating in this study (n = 176) offer some kind of person-to-person education for their general visitors, typically in the form of animal feeding with a verbal presentation, keeper talks and also through contact with docents, volunteers or guides (Table 3). More than half (54%) of the participating zoos provide their general visitors with an education through animal shows, the greatest proportion being zoos within region 3 (75%). Fifty-eight per cent of responding zoos from region 1 have an animal contact area within their zoo, which is below the 78% average. It should be noted however, that a chi square test concluded that none of these differences were significant \( (p > .05). \)

To provide respondents with the opportunity to note education communications used within their zoo that were not specifically listed within the questionnaire, an open item was included. It is acknowledged that the open nature of the question limits the generalisability of the data. Zoos were asked ‘Is there any education available or offered at your zoo other than those listed?’ (other than formal school education programs), with ‘yes’ or ‘no’ options. If ‘yes’ was selected, zoos were asked to ‘specify what other education is available or offered at your zoo’. Table 4 summarises the 123 responses given by 79 zoos.

Holiday programs and camps were well represented, with around half the respondents (36 zoos) noting these as educational activities within their zoo. It is also interesting to note the low reported usage of digital media within zoos as a means of education (less than 2%). It is acknowledged that while the open nature of the question may have
Table 4: Summary of Zoos’ Self-Reported ‘Other’ Education Opportunities

<table>
<thead>
<tr>
<th>Communication type</th>
<th>Region 1: Asia-Pacific (n = 10)</th>
<th>Region 2: Europe, Middle East and Africa (n = 47)</th>
<th>Region 3: North and South America (n = 22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holiday programs/camps</td>
<td>40</td>
<td>32</td>
<td>77</td>
</tr>
<tr>
<td>Discovery zones/workshops/education</td>
<td>30</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>centre/touch table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex-situ education</td>
<td>0</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Special events with education</td>
<td>0</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>Social media education (Web, distance)</td>
<td>30</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>learning)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special tours/behind the scenes tours</td>
<td>20</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Digital media/TVs/movies</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: n = 79. 79 zoos gave 123 responses. Values are given as a percentage.

Contributed to this result, it is also surprising, given the rise in popularity of smartphones, applications and QR or quick response codes.

Further analysis was conducted regarding the respondents who stated that they used only signs to educate their general visitors. Table 3 indicates that an average of 11% of respondents fall into this category. Of those respondents, 71% listed other education communications within the questionnaire’s open item and 29% did not. It should also be noted that 100% of those respondents (the 29%, six zoo) indicated at least one other education communication (Table 3), which indicates that not a single responding zoo depends exclusively on signage to educate their general visitors.

Research Question 2: How Do Zoos’ Self-Reported Education Communications Compare With Those Observed at Nine Case Study Sites?

Research question 2 compares zoos’ self-reported education communications with those observed within nine case study sites. Table 5 summarises these data. It should be noted that observations were guided by a checklist and recorded both manually and photographically for consistency. Observations of verbal presentations conducted within zoos (keeper talks, animal shows, or any other talks) were documented and experienced at least twice by the researcher to improve the quality of observations. Information pertaining to volunteer training was derived from guided observation and zoo staff interviews.

In Table 5 a high degree of consistency is evident between zoos’ responses to the online survey and observations made during the nine case studies, with respect to the first eight forms of communication (signs; pamphlets; worksheets; animal feeding with verbal presentation; keeper talks; animal shows; contact area; docents, guides and volunteers). All of these education communication types were specifically nominated in the online questionnaire, which could account for the high rate of consistency between the questionnaire data and observations in the field. The data show that case study site 1 did not report using signs, pamphlets or worksheets in responding to the questionnaire; however, all these education communication types were observed during the site study.
TABLE 5: Comparison Between Self-Reported and Observed Education Communications at Case Study Sites

<table>
<thead>
<tr>
<th>Case study site</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pamphlets</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worksheets</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal feeding with a verbal presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeper talks</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal shows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal contact area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Docents, guides or volunteers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holiday programs / camps</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discovery zone, education centre or touch tables</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Ex-situ education</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Special events with education</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Social media education (Web, distant learning)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special tours/behind the scenes tours</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital media/DVDs/movies</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

Note: (n = 9). Blank = Observation consistent with reporting; R = Reported NOT observed; O = Observed NOT reported.

visit. Site 1 was a non-English speaking zoo, however, and the online responses to these questions could have been a result of simply misreading the question.

Of the remaining discrepancies between the online survey data and observations made during fieldwork, two sites (case study sites 3 and 6) reported education communications that were not observed. Additional analysis revealed that case study site 3 reported animal feeding with a verbal presentation, but this was not observed. Site 6 reported keeper talks and although there were signs at animal enclosures stating keeper talk times, these were not observed and did not occur during the 7-day site visit.

Further analysis was conducted on the documented observations of person-to-person education within the case study sites. While the online questionnaire indicated that 70% of responding zoos offer person-to-person education, the quality and quantity was observed to vary greatly. For example, three of the case study sites reported providing general visitors with animal shows. There was, however, very limited educational content within the shows' dialogue; rather, entertainment seemed to be the shows' focus. Another three case study sites provided shows with a high level of educational content, though the delivery varied greatly. Two of the sites provided an entertaining and articulate presentation, which was delivered at a rate that could be easily understood and followed by the audience. The key educational messages were repeated several times by the presenter and further enhanced by the presence of animals. The other site offered a range of shows and talks full of educational content; however, they were delivered
at a very rapid rate and most were difficult to follow due to poor articulation and the
presenters being out of breath.

The quality and actuality of keeper talks also varied greatly within the case study
sites. Eight of the nine sites indicated that they had keeper talks within the online
questionnaire. While some sites had signs indicating talks at a particular time, they did
not occur during the 7-day data collection period. Some of the case study sites provided
keeper talks that engaged the audience and provided personalised information about
the animals on exhibit. Other sites had talks that were less engaging and the keepers
were observed to speak very quietly and actively avoid visitor questions.

The quality of visitor interaction was also found to vary greatly between docents or
volunteers at different case study sites. During staff interviews, only one site was found
to provide docents and volunteers with extensive training. These docents were observed
to have extensive knowledge about the animals on display and actively engaged with
general visitors. Docents at other sites were friendly and approachable, though they
were observed to lack even basic knowledge about the animals or facilities within the
zoo. Docents were also observed to act as crowd control rather than interact with visitors
at two sites. It was also observed that docents were placed at busy exhibits where the
animals were very active rather than at exhibits where animals were resting.

The remaining education communications (programs/camps; discovery zone, educa-
tion centre, touch tables; ex-situ education; special events with education; social media
education; special tours; digital media) were not specifically listed within the question-
aire and were derived from an open item. As such, it is acknowledged that generalis-
ability is limited. However, what is interesting to note is the high number of instances
where education communications were not noted within the open questionnaire item
yet were observed or experienced during the data collection period (indicated by ticks
in Table 5). This highlights two important considerations: (1) the benefits associated
with utilising a mixed methods approach, which has demonstrated that the inclusion
of case study observation provided the opportunity to triangulate survey responses, pro-
vided by the nine zoos in question, which then led to a better representation of what
they actually do in terms of visitor education; and (2) that it is more typical for a zoo
to omit an education communication rather than include one that was not observed or
experienced during data collection at the nine case study sites. Only one case study site
(of nine) appeared to have consistently reported all their education provisions as was
subsequently observed and documented during case study fieldwork (case study site 4,
Table 5).

Research Question 3: To What Level Do General Visitors View Exhibit Signage?
Case study zoo visitors (n = 540) were asked how many signs they had read at the
animal exhibits. The question was a closed rank scale with five options (none, some,
half, most and all). Figure 2 summarises the data providing the average and regional
variations.

On average, 95% of the participating visitors read at least some of the exhibit signs
and 58% read at least half the signs (Figure 2). It is interesting to note that there is
little deviation from the average when regional comparisons are made.

During the interview process, many visitors stated that they only read the sign to
discover what animal was in the enclosure. Further research is recommended to deter-
mine how much of the signs visitors read beyond the animal's common name.

Given the proportion of visitors who reported reading at least some of the signs
(95%), the research supports the value of signage being placed at an animal's enclosure
in terms of visitor usage. It then becomes important to understand why zoo visitors do
not read all the signs. More than half the participating visitors provided a response
to an open interview item asking why they had not read all the signs \( (n = 283) \). The remaining 267 respondents were either not asked the question, due to stating that they had read most or all of the signage, or had not provided an answer. Figure 3 summarises the responses.

The main reason zoo visitor gave for not reading all the exhibit signage was that they were watching the animals, accounting for 33% of the comments (Figure 3). This is more than double the next most frequent response, [lack of] time (14%). Seven per cent of the comments related to children being the reason for respondents not reading signs, and while a more specific reason was not given, the data supports the need for additional or alternative communications designed to engage children and families to improve a zoo's educational reach.

Nineteen per cent of responses related to familiarity with the animals or information and the animal not being interesting. Twenty per cent of responses related directly to the signage (difficult to access or read sign; too much information to read, signs boring or uninteresting; too many signs; language) and 14% of the comments related to time. These factors account for 53% of the comments made by zoo visitors as the reason they are not reading exhibit signage. The data shows that zoos must entice visitors to read the signs by providing new information, improving access and readability, accounting for time issues, or providing the information using a different type of communication. This should be investigated further, and signage should be designed to highlight key conservation messages that can be accessed and read quickly and easily.
Additional analysis was conducted through documented observations of the signage at the case study sites. Sign diversity across all sites was typically due to replacement over time rather than a conscious effort to provide variety. As such, the older signs were faded and generally in poor condition, and some were completely unreadable. New signs were typically full colour, large in size, and most observed were textually complicated. One case study site used the same format for all their species signage and while that may sound uninteresting, the design and format were visually appealing, as was evident by the number of visitors observed engaging with the signs. The placement and height of the signs also meant that they could be read even when very crowded. This was in contrast to another case study site that also maintained a particular format for the majority of their species signs, but which were difficult to read due to the small font size, were weathered and faded, and accessible only when visitors were directly in front of the enclosure, meaning that during busy times, visitors even one person back from the front could not read the signs. Another case study site provided signs that only stated the animal’s common and scientific name — no other signage or any form of interpretation was present. Many of the visitors interviewed at this site made comment during the interview that they wanted to learn more about the animals and wanted more signage.

**Discussion**

This article provides an overview of the education communications used today within 176 zoos across 50 countries representing different contexts on a global basis. Through an online questionnaire and case studies, this research offers a broad snapshot of the types of education communications available to general zoo visitors. The research then focuses on the primary communication type, signage, which was reportedly used by 97% of participating zoos. Being the most prevalent form of communication, it was important to establish what proportion of the signs visitors reported reading and their reasons for not reading all the signage during a zoo visit.

In 1981, Van Den Brink claimed that species signs were the only source of information available to the majority of visitors, despite the development and growth of new forms of communication within zoos. The results from this research indicate that while signs are still the most common form of education communication, all of the zoos
that participated in this research provided at least two different types of communication to their general visitors. However, can we consider two types sufficient to say that zoos offer multiple layers of education and experience, as recommended by Vernon and Boyle (2008)? Also, the use of person-to-person education, while well represented, was found to vary greatly in quality and educational benefit. Within the literature there is little argument against the potential benefits of person-to-person education within a zoo context. Data obtained from the online questionnaire suggests that three in four zoos use guides, docents and volunteers as education communicators. However, the nine case studies conducted in this research revealed that zoo educators’ ability to engage with their audience, use appropriate knowledge and effectively communicate with their audience was observed to be an exception rather than the rule. Many of the guides, volunteers or docents encountered were observed to lack even basic knowledge of the animals and zoo facilities, with many acting as crowd control rather than educators. As such, it seems that educational opportunities were missed and audiences were not given the chance to engage in free-choice learning. While it is acknowledged that the generalisability of these results to all zoos is limited, it does raise an important concern that should be investigated further, because if this is a widespread issue it needs to be addressed to enable zoos to more effectively communicate with their general visitors.

Zoos’ reporting of education communications via this study’s online questionnaire compared to case study observations revealed that it was more typical for a zoo to omit a type of communication used rather than report types of communications that were not observed. Less than one third of participating zoos reported utilising discovery zones, education centres and digital media as education communications within the online questionnaire (Table 4). However, case study data found that seven of the nine case study sites did in fact have some of these educational opportunities available to their general visitors. This raises two important points: (1) that the omission of such education communications by zoos via the open item does not necessarily mean that they do not have them available, and (2) it highlights the benefits associated with the study’s use of a mixed method approach, which captured a fuller indication of zoos’ education communications by combining data from both the online questionnaire and case studies. Given that research (Anderson, 2005; Ballantyne, Fackler, Hughes, & Dierking, 2007; Smith & Broad, 2008; White & Marcellini, 1988) supports the educational value of such diverse forms of communication, it would be interesting to investigate whether or not they are utilised more widely within zoos via direct questioning or observation.

Educating visitors within zoos using technology such as videos or computers has historically been a contentious issue, primarily driven by a desire to keep the experience real. Problems have also been noted due to exposure and vandalism. In 2002, Wagner discussed the use of technology in zoos as a growing trend, especially important for potentially engaging the teenage audience; and later, O’Connor (2010) reported that interactive technology was both a current and future trend within American Zoological Association zoos. Perdue, Stoinski, and Maple’s (2012) study found that in the absence of person-to-person education, video was a more effective educational communication than signage alone, and studies report the benefits of linking scientific inquiry and mobile technology within informal learning environments (Bull et al., 2008; Marty et al., 2013). Yet despite this and the popularity of smartphones and the development of mobile applications and quick response codes, which effectively negate issues of both exposure and vandalism, not a single case study site was observed to provide these as ways of interacting with general visitors or provide them with information that could be accessed after their zoo visit.

The evolution of zoos over time has resulted in a continuum of enclosure modernisation, both within the same zoo and across zoos within the same region (Filby, 2008).
Case study observation, guided by a checklist and recorded photographically, revealed enclosures ranged from small concrete pens with steel bars to enclosures with mounds and electric fences through to mixed species and immersive exhibits, often within the same case study site. This mix of old and new exhibits has resulted in a variety of taxonomic signage and interpretive material throughout the same zoo that ranged from older faded black and white taxonomic labels to modern full colour graphics. Signage has been reported as the most commonly used education communication type within zoos (Table 3), and 95% of visitors report reading at least some of the signs (Figure 2). However, when analysing the reasons why visitors do not read signs, half the problems cited relate to the signs’ presentation or the time required to read them, considerations discussed by Serrell (1981b) more than 30 years ago and also by Bramley (1989). For zoos and zoo educators, this research has provided a broad baseline of information regarding the education communications used today within 176 zoos around the world, and demonstrated the high level use of signage by both zoos and general zoo visitors. These factors highlight the value and importance of signage within zoos when ‘talking’ to or communicating conservation messages to zoo visitors. Sign design and content has been researched in the past (Serrell, 1981b, 1988), but in more recent times there has been a trend to provide so much information that visitors do not read the signs due to a perceived lack of time. This indicates a discrepancy in communication aims and highlights the need for zoos to revisit their visitors’ needs, in terms of signage. The popularity and low costs associated with incorporating smart phone technology such as QR codes could enable zoos to provide additional information to visitors without the need for expensive graphics. This would also enable visitors to retrieve information at their leisure, even after their zoo visit, thus potentially extending zoos’ educational reach. It is not the authors’ intention to appear pro-technology, simply to raise discussion of a potentially useful communication that may solve current barriers, such as visitors’ perceived lack of time and zoos’ desire to communicate conservation messages.

Within this research it is important to understand the diversity of zoos that participated. Seventy per cent of the countries with zoos listed within the database participated in the online questionnaire and they represent very different social, cultural and economic situations. These conditions result in a unique context for each zoo and have a direct influence on the visitor experience. As such, the reported use of such a diversity of education communications across the different regions should be acknowledged, encouraged and further supported through collaboration and shared knowledge. But how do we measure educational success? If we accept that the provision of multiple types of educational communications provides visitors with the opportunity to engage in free choice and immersive learning, and that person-to-person contact, via keeper talks, docents or animal shows, facilitates a connection between visitors and the animals, then a large proportion of participating zoos are providing an education. Zoos are ‘talking’ to their visitors. However, the value of that education and the quality of the visitor experience were observed to vary greatly with overarching statements are neither accurate nor informative. To understand and improve a communication’s educational potential, further investigation is required to examine each type of communication in more depth. By gaining a comprehensive and multicultural, or global, understanding of a communication’s effectiveness in direct relation to visitor learning, it should be possible to provide zoos with priority types of communication for conveying conservation messages to their visitors. With that knowledge, rather than offering the generalised view that more types of communication necessarily mean better communication, zoos will be able to ‘talk’ to visitors in such a way that they are more likely to ‘listen’.
Acknowledgments
Special thanks to all the zoos that participated in this research and to the associations that provided their support, including the International Zoo Educator’s Association, the Canadian Association of Zoos and Aquariums, the Pan African Association of Zoos and Aquariums and the European Associations of Zoos and Aquariums. Special thanks also to Chapultepec Zoo, Colchester Zoo, Columbus Zoo and Aquarium, Johannesburg Zoo, Loro Parque, Moscow Zoo, Taronga Zoo, Toronto Zoo and Zoo Negara for their outstanding contribution to this research (these zoos are not listed in site order and written permission was given for acknowledgment).

Keywords: zoo education, zoo communication, zoo visitors, interpretation, signage

References
Bramley, F. (1989) Graphics before evaluation? Even with the cart before the horse, it’s possible to finish the race. Visitor Studies, 2, 62–64.


International Zoo Educators Association (IZE). (2011, April.). *IZE Newsletter, 9*.


**Author Biographies**

**Katie Roe** is a PhD candidate studying zoo education and evaluation practices. Katie’s research investigates how modern zoos design, implement and evaluate their formal
and informal education experiences. Katie also examines the visitor’s perspective during an informal zoo visit and the extent to which it is consistent with the zoo’s desired informal education experience.

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Caroline F. Mansfield is a Senior Lecturer in Teacher Education in the School of Education, Murdoch University, Western Australia. She lectures in learning processes, teaching, and motivation. Caroline’s research broadly focuses on students and teachers in learning contexts, with current national and international projects regarding teacher motivation, instruction, and resilience. Caroline has been project leader of two successful funded projects on teacher resilience and has received awards of excellence for research, teaching and service to the community.
Chapter 5. Main Findings and Discussion

This chapter draws together the major findings of four empirical studies that investigated the prioritisation, provision and evaluation of education in zoos and also discusses future research directions. Specifically this research focused on zoos’ visitor education communication strategies, measures of educational success typically used and zoo visitors’ educational experiences. The results of the research are derived from data gathered in 191 zoos from 52 countries, representing zoos from vastly different social, political and economic contexts.

Due to methodological limitations however, the findings of this research cannot represent the educational practices of all zoos or the views of all visitors. Nevertheless it does provide a broad global perspective of zoo education and the visitor experience. The studies within this research project provide valuable insight into visitors’ learning agendas, their engagement with zoo exhibit signage and their opinions regarding how zoos should prioritise their stated roles and responsibilities. The findings of this research also result in a better understanding of the types of education communication that are typically used by modern zoos and zoos’ understanding and use of educational program evaluation.

The following discussion is structured in accordance with the research aims of the project. However, the nexus between each area investigated and zoo education as a whole is reflected in a blending of associated findings and implications. These interconnections blur the specific boundaries of each aim and consequently, subheadings are provided only as a general guide. The utilisation of mixed methods research is also discussed, followed by future research directions.

The aims of this research project were:

• To study zoo education from both zoos’ and zoo visitors’ perspectives on a truly global basis, beyond the boundaries of zoo accreditation, across numerous social, cultural and economic fields.

• To broaden understanding of zoo visitors’ motivations and agendas, specifically to ascertain if learning is part of visitors’ agendas.
• To better understand the priority roles of zoos in modern times as perceived by zoos and zoo visitors.
• To empirically understand how modern zoos communicate with their visitors and the levels to which visitors engage with exhibit signage.
• To investigate the use of evaluation within zoo education, especially in zoos’ formal education provision.

A Global Approach to Research
This research aimed to involve as many zoos (open to the public) as possible, beyond the boundaries of accreditation, to represent zoos operating within vastly different contexts. This aim was achieved and the research represents the views of 191 zoos from 52 countries, 72% of the countries listed within the research database. The resultant findings are representative of participating zoos across the globe operating in numerous social, cultural and economic fields. As such, and noting acknowledged limitations, the conclusions drawn within this research have the potential to be applied to numerous zoo contexts.

Zoo Visitor Motivations and Learning
As noted earlier, visitor studies investigating motivation have been dominated by museum experiences, and those few studies conducted within the context of zoos have typically focused on visitors’ primary motivation or main reason for visiting a zoo (Morgan & Hodgkinson, 1999). This research has enquired beyond the primary reason and specifically focused on visitors’ learning agendas. The findings suggest that the majority of visitors arrive at a zoo with a hope or expectation of learning during their visit. It is not important to highlight specifically what visitors want to learn but more the idea that they are receptive to learning during their visit to the zoo. This is consistent with Falk’s (2005) notion that individuals actively engage in free choice learning when guided by their own interests. This finding is further supported by the high priority visitors gave to educational activities when asked to rate the importance of zoos’ roles and responsibilities and also the comparatively lower priority visitors gave to zoos being a place for people to relax and socialise.

When comparing these results to those of responding zoos, the majority of participating zoos also believe their visitors have a hope or expectation of learning during their zoo visit. Vernon and Boyle (2008) found that zoo visitors desire additional and more
intensive education opportunities within their zoo visit and Falk et al. (2007) noted that today’s zoo visitors have a more sophisticated knowledge of animals and the environment than expected by the Association of Zoos and Aquariums (AZA) Conservation Education Committee. When we consider these views together with the notion that zoos have increasingly promoted themselves as educational institutions (Packer & Ballantyne, 2010) it is not surprising that this study found zoo visitors arrived with an expectation of learning.

The Role of Zoos in Modern Times
Zoos however, continue to identify relaxation as a priority, significantly more frequently than their visitors. This could be a result of the historical perspective that zoos are a location for family fun and socialising where education needs to be subtle and clever (Anderson, 2003; Packer & Ballantyne, 2010; WAZA, 2005). Alternatively, it could potentially be due to zoos’ understanding of visitor needs based on research that focused on visitors’ primary motivations and, as a result, zoos may not have had a complete representation of visitors’ motivations beyond those primary reasons. Another contributing factor could be related to zoos’ reported use of informal measures to determine what their visitors want to experience which, as this research suggests, may have resulted in zoos missing the cultural shift from visiting zoos for entertainment to visiting zoos for entertainment and learning (Mallapur, Waran & Sinha, 2008).

Another indication that zoos are not completely apprised of their visitors’ needs was evident by the difference in priority given to viewing of endemic or locally native animals. The reasons zoo visitors rated this activity as a priority for zoos was not investigated but given the findings that less than half participating zoos rated this responsibility as important it is something worth considering. As education institutions that provide formal education to school children, zoos housing a diverse range of endemic species may help students connect with their own environment and encourage participation in local conservation projects and sustainable living (Tanner, 1980). For general visitors engaging in free choice learning, local people would also have an opportunity to connect with their regional environment and visitors from abroad would be able to see locally native species without the need to visit wild areas.

Within the study investigating zoos’ roles and responsibilities, two other areas of importance were noted by responding zoos and zoo visitors. Zoos identified the
importance of their involvement in research, study and training, yet zoo visitors did not identify this role. Given its importance, as perceived by zoos, it would appear that this is an opportunity to further educate visitors of another priority zoo activity. Research, study and training are another form of education and although not directly related to community education, the benefits to conservation as a whole are worthy of active promotion. Anecdotally, one of the case study zoos was observed to publicly promote their extensive species conservation programs and resultant knowledge. Nurseries with public viewing opportunities enabled visitors to see first hand, the zoo’s conservation efforts. Visitors could see orphaned animals being hand-reared and learn about the zoo’s conservation programs via textual information provided in three languages. The signs explained why the animals were being hand reared and the knowledge gained from the experience that was then used to manage wild populations. The exhibit was very popular with visitors and provided a direct example of the zoo’s involvement in conservation and how that involvement related and contributed to research, study and training.

Also within that study, visitors identified animal welfare as a priority for zoos, an issue synonymous with zoos, particularly in the last century. Zoo visitors are believed to base their perceptions of an animal’s welfare on aesthetics (Melfi, McCormick & Gibbs, 2004), the way an animal looks and the type of enclosure or housing. Zoos could address visitors’ concerns by providing information regarding welfare and husbandry matters, especially potentially confronting concepts such as night quarters that are seen by visitors as bare concrete pens. An explanation detailing the importance of minimising potential hazards to keep animals safe and injury free demonstrates care and welfare rather than cruelty or neglect. The ways in which zoos communicate these and other education messages to their visitors then becomes significant.

**Zoos’ Communication with Visitors**

Taxonomic species signs and, more recently, graphic interpretive signs located at animal enclosures have been the main form of communication between zoos and their visitors for many decades. Communication diversity in zoos has expanded in recent years, driven by research into visitor identity and free choice learning, as a way to cater to different visitor needs and expand educational reach. Findings from this research suggest that zoos use an array of methods to educate their visitors including signs,
pamphlets, worksheets, animal contact areas and purpose built education centres, and person-to-person communication.

Visitor research derived from this project also revealed that zoo visitors place great importance on viewing the animals. This is neither a surprise nor new but something that needs to be reconsidered by all zoos, especially those with naturalistic enclosures where animal visibility may be compromised (Moss & Esson, 2010). Anecdotally, visitors were observed looking for animals in enclosures, glancing at signs to establish what was meant to be in there and spending only a brief moment searching again. Perhaps visitors’ opportunity for viewing could be improved by identifying an animal’s favourite resting places, or, where practical, provision of a life size silhouette of the animal to assist discovery, or a sign noting usual times of activity. Alternatively, rather than placing docents or volunteers at enclosures where animals are active, place them at enclosures where animals are inactive (Jackson, 1994), create an opportunity for visitors to connect with the animal through conversation with docents (Mony & Heimlich, 2008) who could point out the elusive creature and provide person-to-person education.

Prior research has indicated that person-to-person education can both entertain and facilitate a personal connection with the animal on display, potentially enhancing conservation messages given by the zoo’s presenter (Anderson, Lucas & Ginns, 2003; Falk et al., 2007; Jensen, 2009; Kreger & Mench, 1995; Mony & Heimlich, 2008; O’Connor, 2010; Packer & Ballantyne, 2010; Swanagan, 2000; Vernon & Boyle, 2008; Wagner, 2002). Within the findings of this research, most participating zoos report using some kind of person-to-person education for their general visitors, typically in the form of animal feeding with a verbal presentation, keeper talks and through contact with docents, volunteers or guides. This research also found however, that the quality of those communications varied greatly in terms of both educational content and effective delivery. Given the evidence supporting the potential effectiveness of person-to-person communication, zoos’ reported desire to educate visitors and visitors’ learning expectations, person-to-person communication needs to be reviewed and refined on a regular basis to ensure education messages are being delivered effectively and received clearly by the intended audience.

This research also revealed that despite the array of communication strategies available to and reported by zoos within the findings, signs are still the most prevalent form of
communication between zoos and their visitors. The research also shows that visitors are engaging with exhibit signage, with the majority reporting that they read at least some of the signs. Given these findings and the importance of signs as a key form of communicating educational messages, the reasons why visitors do not read all the signs becomes significant. This research found that the main reason for not reading signs was watching animals and the second most common response was a perceived lack of time. This situation poses a dilemma for zoos, when visitors are most engaged with an animal on display, and arguably most receptive to learning, they are least likely to read the signs.

Sign placement and design then become critical aspects to attract visitor attention (Arndt et al., 1992), a notion further complicated by the research findings. More than half the reasons for visitors not reading all the signs related to access, readability and familiarity with the animal or information. It is concerning that these issues were raised by Serrell (1981) more than thirty years ago and also by Bramley (1989) yet still remain a concern today. Many signs observed at case study sites were placed at the front of an enclosure, usually at waist height. If the exhibit was crowded, only the front row of visitors could see the information. Also, many signs were observed to present textual education messages over a photographic image. While these signs may be visually attractive as a whole, they were also difficult to read which is clearly counterproductive to educating visitors. Noonan (1981) identified the importance of avoiding excessive ornamentation or embellishment and the value of producing signs with effective visual communication. Readability concerns noted by visitors included font style and size, amount of text and inability of visitors from abroad to read or understand the local language. These are critical issues if zoos are dependent on signage to communicate their conservation messages to visitors.

There are a number of possible solutions to improve readability of signage beyond size and style of font. Zoos could assess the location and height placement of existing signage and relocate to a more accessible location if necessary. Zoos could revisit the use of symbols in their signage. Symbols provide zoos with a communication strategy that overcomes issues associated with language, readability and excessive text yet only two of the nine case study sites were observed to use symbols consistently as part of their signage. The use of symbols would enable visitors to potentially receive more
information at a glance, than could be achieved with text (Noonan, 1981; Van Den Brink, 1981).

Finally, zoos could address visitor concerns regarding perceived lack of time and excessive text by refining education messages to communicate only key information and perhaps by adopting a more consistent approach to conservation messages throughout the zoo. As such, rather than bombarding visitors with myriad environmental problems (Bramley, 1992), zoos could simplify the process by communicating only key issues that are most relevant to zoo visitors and providing visitors with straightforward, doable actions that are reinforced consistently throughout their visit to encourage participation in living sustainably.

The simplification of signage and subsequent reduction in textual material may result in an undesirable loss of information, which could be countered by the use of technology. There are arguments for (Clay et al., 2011; Perdue et al., 2012; Wagner, 2002) and against (Wineman et al., 1996) the use of technology in zoos but the popularity of smartphones and the development of mobile applications and mechanisms such as quick response (QR) codes provide zoos with an effective communication tool worthy of consideration (O’Connor, 2010). Familiarity with an animal or information was another key reason visitors gave for not engaging with exhibit signage. For example, QR codes could be positioned onto new or existing signage and provide visitors with a link to additional information during and after their zoo visit. The type of information provided within QR codes is only limited by imagination and presents zoos with an opportunity to address language barriers, enhance existing education messages and provide additional and updated information about the animals to their visitors.

**Zoos’ Evaluation Practices**

Zoos’ provision of education to general visitors and school children participating in a formal program does not necessarily equate to educational success. In recent times zoos have increasingly promoted themselves as education institutions (Packer & Ballantyne, 2010) and zoos’ potential to educate general visitors is well represented in the literature (Adelman et al., 2000; Ballantyne et al., 2007; Bitgood et al., 1988; Dunlap & Kellert, 1989; Lindemann-Matthies & Kramer, 2005; Randler et al., 2007; Swanagan, 2000). However, claims that a visit to the zoo will equate to positive conservation actions are largely unsubstantiated (Falk et al., 2007; Kohl, 2004; Moss & Esson, 2013; Swanagan,
2000) and research conducted by Adelman et al. (2000) suggested that visitors lost their commitment to conservation only weeks after their visit. For zoos to claim educational success they are under increasing pressure to provide evidence for their educational impact (Moss & Esson, 2013).

The use of evaluation to justify, verify and develop education in zoos has been encouraged for almost a decade (Edinburgh zoo workshop, 2005; WAZA, 2005). The findings within this study show that zoo educators have a considerable understanding of education program evaluation and its potential application to current and future program development. The majority of participating zoos incorporate aspects of evaluation into their programs with the objective of proving a program’s worth usually via satisfaction surveys. However, there is little evidence within the findings that zoos from any region evaluate their educational value from the perspective of student learning for the purpose of program improvement or development. Further, zoos’ assessment of general visitor learning is almost entirely dependent on informal measures and, as demonstrated within this research, does not provide zoos with a completely accurate representation of what visitors want to learn or the extent to which learning has been achieved during their zoo visit.

Research investigating why zoos are not currently evaluating their education provision for the purpose of student and visitor learning or program improvement may provide a level of understanding. However, given that zoo educators were found to have a considerable knowledge and understanding of evaluation processes, the development and guided application of an evaluation model, developed specifically for zoos would seem to be more immediately beneficial. Stufflebeam’s (2001) Decision/Accountability family of evaluation approaches may provide zoos and zoo associations with an appropriate base for model development. Together, zoos and governing associations could develop clear and specific guidelines which would then enable individual zoos to collaborate with other stakeholders to craft an evaluation model specific to their needs (Jacobson, 1991; Norland & Sommers, 2006; Weiss, 1998). In addition, once equipped with such a model, zoos could seek and encourage collaboration with classroom teachers (Davidson, Passmore & Anderson, 2009; Marshdoyle et al., 1982) to further refine the model for specific purposes including providing evidence of satisfaction and information directly from students, perhaps after their zoo visit, that could be used to improve the zoo’s educational value.
Concerns have been raised within this project regarding the educational quality of key communication types, specifically signage and person-to-person communication. An opportunity for zoos to provide consistent education messages throughout their zoo has been identified and could be further enhanced by empowering visitors with relevant, simple, doable actions (Stoinski, Allen, Bloomsmith, Forthman & Maplme, 2002). The active adoption of sound evaluation can provide zoos with a toolbox of processes and strategies to systematically gauge their educational success across a range of communication types. The provision of evaluation guidelines, including clearly defined purposes, will provide zoos with the opportunity to use those tools in ways that strengthen their educational capacity at the forefront of conservation education.

**Mixed Methods Research**

During the conceptual phase of this project, the shortcomings of prior research investigating zoo education (as discussed in Chapter 2) were given serious consideration when constructing the research framework. As previously noted, quantitative methodologies have been favoured by the majority of researchers exploring zoo education (Gutierrez de White & Jacobson, 1994; Kellert, 1979; Marshdoyle et al. 1982; Swanagan, 2000) with a few using qualitative methods (Patrick et al., 2007; Pringle, Hakverdi, Cronin-Jones & Johnson, 2003) and fewer still a mixed method approach (Vernon & Boyle, 2008; White & Marcellini, 1986; Wineman et al., 1996). Of those using mixed methods, scope was limited to either a single site or multiple sites within the same region.

Conceptually framed within pragmatism, this project has employed mixed methods to produce a range of information that enabled the production of data rich studies that benefited from having both quantitative and qualitative data. The inclusion of multiple sites across numerous regions greatly increased the scope of the research. Combined and noting limitations, these factors expand the relevance of this research to a wide diversity of zoos across the globe and increase the potential value of the practical solutions offered to zoos based on findings within this project. Arguably, another potential benefit is one of demonstrating to other researchers that mixed methods can be applied to a complex social situation to provide a depth and breadth of data difficult to achieve using only qualitative or quantitative methods (Johnson & Onwuegbuzie, 2004).
Future Research Directions

This project, represented by four empirical studies, illustrates an approach to investigating zoo education that utilised mixed methods in multiple, context specific sites. The literature review conducted by Dierking et al. (2002) identified a need for context specific, multi-site studies that could provide broader perspectives and draw conclusions that were applicable to a number of zoo contexts. In response, this project aimed to study zoo education from both zoos’ and zoo visitors’ perspectives in multiple sites on a truly global basis. The resultant methodology developed for this project produced a number of challenges that were identified and mitigated throughout the research period. Two key challenges, directly related to multi-site investigation, included the generation of a database of zoos and the administrative requirements of zoos to facilitate their participation.

The generation of the database was dependent on contact information available through zoo associations, relevant publications and zoos’ websites. As such, the time investment required to develop the zoo database was extensive and contact information difficult to verify. Several zoo associations provided invaluable assistance facilitating contact with their members; some associations chose not to assist. Perhaps zoos and their associations could review the availability of their contact information with a view to ease database generation for future research.

Another challenge involved the extensive administrative requirements of different zoos to facilitate participation in both Phase 1 and Phase 2 of the project. Many zoos required completion of a site-specific application package, which often resulted in a duplication of information already provided. Also, several case study sites required specific ethics approval and did not recognise the approval granted by Murdoch University. This current situation required a high level of commitment by the researcher to secure zoos’ participation. Perhaps through collaboration, zoos and their associations could produce a generic research application that provides zoos with the necessary information to determine participation in a research project and also, through broad acceptance, reduced the level of administration.

The findings within this research project are derived from qualitative and quantitative data gathered in 191 zoos from 52 countries, including nine case studies, and has produced a broad perspective of zoo education and the visitor experience. The
conclusions and implications drawn from these studies are nonetheless preliminary and raise a number of issues relevant to further research to improve understanding. The following research directions are intended to extend this present research with the aim of contributing to the improvement of zoos’ education provision.

First, the effectiveness of education communication types used by zoos to deliver messages to visitors needs to be analysed. Previous research (De Herder & Streiter, 2010; Falk, 2006; Fraser and Sickler, 2008; Kola-Olusanya, 2005; Morgan & Hodgkinson, 1999; Packer & Ballantyne, 2010; Sommer, 1972; WAZA, 2005) suggests that offering a variety of communications to visitors enhances zoos’ educational reach. Presently there is little research to indicate which types of communication have the broadest appeal or which have the greatest impact on visitor learning and conservation behaviour. Comparative research investigating the impact and effect of different education communications may equip zoos with the information necessary to focus resources on priority communications, maximising educational opportunities.

Second, the potential value and application of QR codes, or similar technology, needs to be investigated. It would be particularly valuable to investigate use by visitors from abroad who do not speak the local language and are therefore unable to read the signs. Furthermore it would also seem appropriate to measure the use of QR codes by regular visitors to the zoo, who may already be familiar with the information provided on signs, as a means for accessing new or additional information about the animals.

Third, the level to which zoos evaluate their education provision when provided with tailored evaluation guidelines and/or an evaluation model needs to be examined. Presently, as found within this research, zoos are not actively evaluating their education provision from the perspective of student and visitor learning with the purpose of program improvement or development. It is thought that the development of specifically tailored evaluation guidelines for zoo education may provide zoos with the confidence and encouragement to more routinely implement education program evaluation. It is envisaged that such research would involve collaboration with numerous zoo associations and zoos representing different contexts to ensure resultant guidelines are widely supported, accepted and regularly used. In conjunction with evaluation guidelines, there is an opportunity to develop an evaluation model, specifically tailored
for zoos, with enough pliability to be used in a variety of contexts with careful consideration being given to social, political and economic differences.

To conclude, the abovementioned directions for future research are not exhaustive and the present project opens doors to many other areas in need of further investigation. The suggested future research areas are proposed to provide zoos with immediately beneficial tools and data that seem likely to guide them towards maximising their education provision and achieving their stated education goals.
References


Bramley, F. (1989) Graphics before evaluation? Even with the cart before the horse, it’s possible to finish the race. *Visitor Studies* 2 (1), 62-64


British and Irish Association of Zoos and Aquariums (BIAZA) (2012) Secretary of State’s standards of modern zoo practice.


Canada’s Accredited Zoos and Aquariums (2008) CAZA policy re: development and evaluation of educational activities in zoos and aquariums.


http://www.eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?nfb=true& &ERICEExtSearch_SearchValue_0=ED259912&ERICEExtSearch_SearchType_0=No.&accNo.=ED259912.


Dierking, L., Burtnyk, K., Buchner, K. & Falk, J. (2002) *Visitor learning in zoos and aquariums – A literature review.* American Zoo and Aquarium Association (AZA); Annapolis, MD.


International Zoo Yearbook 41, 223-398.
You are invited to participate in this study!

Zoo Education: A Comparative International Study of Zoo Intentions and the Visitor Experience.

With your assistance, I aim to develop understandings about the ways in which zoos communicate with their visitors and how the visitors perceive those communications. The resulting insights and recommendations will be shared with all contributors.

What Does Your Participation Involve?

There are two independent stages to this research project. Your voluntary and confidential involvement in Stage 1 means completion of a questionnaire, which should take approximately 15 - 20 minutes to complete. You can choose to complete the questionnaire either online or I can call you at a prearranged time to conduct the interview over the phone. Stage 2 involves a number of case studies. Participants may take part in Stage 1 only, or choose to be involved in both Stage 1 and Stage 2.

Questions

Further information is contained within the letters attached to this invitation. If you would like to discuss any aspect of this study please feel free to contact me via the link below.

Your Participation

Your contribution will be very valuable and I would be grateful if you could contact me as soon as possible to state your interest in participation and your choice to participate via an arranged phone interview, or via the Internet.

Please email your response to Katie Roe

Thank you for your kind and valued contribution to this research.

Yours faithfully

Katie Roe
PhD Researcher
Email: katie.roe@murdoch.edu.au

www.murdoch.edu.au

This study has been approved by the Murdoch University Research Ethics Committee (Approval 2009 / 041). If you have any reservations or complaints about the ethical conduct of this research, and wish to talk with an independent person, you may contact Murdoch University’s Research Ethics Office (Tel. +61 08 9360 6677 or email ethics@murdoch.edu.au). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix 2: Project outline

Zoo Education: A Comparative International Study of Zoo Intentions and the Visitor Experience.

National and International Zoo Questionnaire

Contact Person: Katie Roe
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Murdoch University
South Street, Murdoch
Western Australia 6160

You are invited to participate in this study.

Background
Research has shown that zoos are in a strong position to educate the general community about conservation and wildlife issues. However, few studies have been conducted to determine the level of conservation communication between the zoo and its visitors.

Aim of the Study
The aim of this research is to explore zoo education to understand the relationships between the description of education missions, the implementation of education programs, or mediums, and the influence of these for zoo visitors.

What Does Your Participation Involve?
Your participation involves the completion of an online questionnaire. The purpose of the questionnaire is to collect data relating to zoo education and the visitor experience. There are no right or wrong answers; I want to understand how YOUR zoo educates visitors and the experiences YOUR zoo offers to visitors.

As you complete the questionnaire you will find that some questions ask you to choose from a selection of options, or rate the importance of zoo related activities, and others ask for a more detailed response. All the questions are valuable and the questions asking for your written response provide me with the greatest insight into your zoo. So please take the time to provide a detailed answer to these questions. The questionnaire will take approximately 15 - 20 minutes to complete. All participating zoos will receive a brief report of the findings of the study and the information you provide will be useful in the development of some key principles that may be used as a guide for zoos wanting to improving the level of communication between a zoo and its visitors, with the potential of enhancing future zoo experiences and maximising conservation communication between a zoo and its visitors.

Your participation in this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. If you withdraw, all information you have provided will be destroyed. All information will be treated in a confidential manner, and your name, or the name of your zoo, will not be used in any publication arising out of the research.
Possible Benefits

This research has the potential to provide an analysis of the level of communication between a zoo and its visitors, providing information relating to the visitor’s perspective and their actual experience within the zoo. This information could then be used to improve zoo education programs, or mediums, which would further enhance a zoo’s educational reach and conservation communication.

Possible Risks

There are no specific risks, or costs, anticipated with participation in this study.

Questions

If you would like to discuss any aspect of this study please feel free to contact me, Katie Roe via email: katie.roe@murdoch.edu.au or my supervisors (contact details below). We would be happy to discuss any aspect of the research with you. You are welcome to contact us at any time to discuss any issue relating to the research study.

Once we have analysed the information we will be emailing a summary of our findings. You can expect to receive feedback within six months after the data collection period is completed.

We would like to thank you in advance for your assistance with this research project. We look forward to hearing from you soon.

Yours faithfully

Katie Roe
PhD Researcher
Email: katie.roe@murdoch.edu.au

This study has been approved by the Murdoch University Research Ethics Committee (Approval 2009 / 041). If you have any reservations or complaints about the ethical conduct of this research, and wish to talk with an independent person, you may contact Murdoch University’s Research Ethics Office (Tel. +61 08 9360 6677 or email ethics@murdoch.edu.au). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix 3: Invitation to participate as Case Study Site

Zoo Education: A Comparative International Study of Zoo Intentions and the Visitor Experience.

Invitation to Express Your Interest in Participating as a Case Study Zoo.

I wish to invite you to express your interest in participating in Stage 2 of this research project, which means involvement as a case study zoo. All zoos are strongly encouraged to express interest as potential case study sites as this will enable identification of a representative sample for the study.

Case study zoos will be asked to provide access to zoo personnel, primarily those involved in education, and also to zoo visitors. I intend to spend approximately 10 days at the zoo for data collection (at some time between mid 2011). Data collection will involve observation of education personnel both during education presentations and during program development (general day to day activities). I would also appreciate the opportunity to interview education personnel and other zoo employees, at a mutually agreeable time, during the data collection period.

Collecting data from zoo visitors is also an essential component of this research, as I need understand the visitor’s experience. I would appreciate your zoo’s permission to survey zoo visitors via a questionnaire. The visitors’ participation is entirely voluntary, completely anonymous and should have a minimal impact on their zoo experience. Adult visitors will be asked to complete a brief questionnaire during their zoo visit and return the form before they leave the zoo.

If you are interested in learning more about participating as a case study zoo, please send me an email stating your interest and we can organise a time to speak on the phone, if convenient, or we can continue to communicate via email on the finer details of participation.

Thank you for taking the time to read this request, I hope you will consider participation in Stage 2 of this research and I look forward to the possibility of learning more about your zoo and its visitors. If you have any questions, please do not hesitate to contact me, my research supervisors or the Murdoch University Ethics Office (contact details below).

Yours faithfully

Katie Roe
PhD Researcher
Email: katie.roe@murdoch.edu.au

This study has been approved by the Murdoch University Research Ethics Committee (Approval 2009 / 041). If you have any reservations or complaints about the ethical conduct of this research, and wish to talk with an independent person, you may contact Murdoch University’s Research Ethics Office (Tel. +61 08 9360 6677 or email ethics@murdoch.edu.au). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

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Dear Fellow Conservation Educators,

Lots of new materials and links are found in this newsletter. As always we ask you to browse through it and have a look—especially our new lesson plans celebrating the United Nations Year of the Forest!

Enjoy reading, your IZE Board

News

- A very extensive bibliography on Visitor Studies has been published on the homepage of European Association of Zoos and Aquariums (EAZA). This 272-page international bibliography contains an overview of existing publications on visitor experience studies and exhibit evaluation.
  
  [http://www.eaza.net/ACTIVITIES/EDUCATION/Pages/VisitorStudies.aspx](http://www.eaza.net/ACTIVITIES/EDUCATION/Pages/VisitorStudies.aspx)
- IZE has created guidelines for researchers who are interested in notifying IZE of education survey requests.
  
- If you’re interested in participating in an approved comparative international study of zoo intentions and the visitor experience, please contact PhD researcher Katie Roe from the Murdoch University. The study involves two phases, one of them is an online questionnaire which should take only 15-20 minutes to complete. The other is more complex. All results will be shared with contributors. Please email katie.roe@murdoch.edu.au for more information or if you are interested in participating.

Check out Membership

- A big thank you to all of you who have renewed your membership! It’s great to network with so many educators joined in one association all over the world.
- What did IZE achieve during the last year? Read it in our Annual Report 2010:
  

Check out Conservation Education

- To celebrate the United Nations Year of the Forests, find a link on our IZE website homepage to lesson plans on different types of forests, wildlife that depends on forests, activities and a table of conservation actions. These materials may spark ideas for new programs. Thanks to all of you who submitted material! [http://www.izea.net/education/yearofforests.htm](http://www.izea.net/education/yearofforests.htm)
- In the latest issue of Zoquaria, EAZA’s quarterly magazine, you’ll find two articles that are of specific interest to zoo educators. Check it out on page 10 and page 28: [http://tinyurl.com/zooquaria73](http://tinyurl.com/zooquaria73)

Check out IZE Resources

- Thank you for supporting developing country educators to attend the 2010 IZE conference through your membership renewals. In 2010, IZE was able to sponsor 10 conservation educators to the conference as a result of our IZE Grants program. We wanted to share a few of their comments here for you that express their appreciation for such a wonderful experience.

  **Joseph from Rwanda:**
  
  “The conference for me turned out to be one of those once-in-a-lifetime events. I met so many amazing people talking about so many wondrous things they have done or seen or heard, and I took home an incredible load of ideas that I am still struggling to sort. As a person interested in connecting people to nature as a lifetime career, I have not had a better conference before.”

  **Diana from Colombia**
  
  “I valued the chance to present some of the work I have led in my institution and being able to watch, listen and ask questions for 4 days! I valued the meeting of different cultural backgrounds, problems and solutions. It is not common that people talk about things that have not worked well, but at the conference I had the chance to hear of a couple of cases and found that infinitely valuable.”

Any comment or suggestion on our homepage, please email Anne.Warner@oregonzoo.org

Any comment or suggestion on our newsletter, please email info@izea.net
Appendix 5: Online Questionnaire

Zoo Education: A Comparative International Study of Zoo Intentions and the Visitor Experience

Case Study Expression of Interest

1. Would you and your zoo be interested in discussing the opportunity to participate as a case study site, as described in the invitation attached to your email?
   - Yes
   - No
   - Maybe

You and your Zoo

2. What is the name of your Zoo?

3. If your Zoo has a mission statement, what is it?

   

4. What is your name?

5. What is your email address?

   

http://karnapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa(2)woi/0txzYG3dfYtzwgFPsDhbg/7.0.1.22.3.1.19  Page 1 of 1
Activities for your Zoo

Please rate the priority of the following activities for your zoo using the scale provided.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very low priority</th>
<th>Low priority</th>
<th>Average priority</th>
<th>High priority</th>
<th>Very high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Captive breeding</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. A place for visitors to see endemic or local animals</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8. A place for visitors to see animals from other countries</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. A place for visitors to learn about animals</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. A place for visitors to learn about conservation issues</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11. A place for school children to learn about animals and conservation</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. A place for all visitors to learn about the zoo's role in conservation</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. A place for all visitors to learn about their own role in conservation</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. A place for people to relax and socialise</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

15. Please specify any other activities or roles you believe are important within your zoo that are not represented in the above questions.

http://karnapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa/2/wo/j0xzTCxjUTlzwpP6oNtjg/8.0.1.22.3.1.19
You have completed 21% of this survey

Your Zoo's visitors

16. Why do people come to your zoo? Or, in your view what attracts visitors to your zoo? (Please be specific and list as many reasons as you feel appropriate)

17. How do you know why people visit your zoo? What information have you used to answer the previous question?

18. How often is visitor information collected within your zoo?
   - Every year
   - Every two years
   - Every five years
   - Every decade
   - Never
   - Other, visitor information is collected -

19. Does your zoo collect information about:
   - Visitor demographics (age, gender etc.)
   - The reason for their visit
   - Their favourite animal / experience
   - What they have learnt during their visit
   - Other (please explain)

20. Is this information used when creating or designing a visitor experience?
   - Yes
   - No

http://teemapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa/wa/2?wo=x0zZG3dT2zqgPLuNqg/9.0.1.22.3.1.19

Page 1 of 1
21. Please select the types of education materials or mediums used within your zoo:
- [ ] Signs at animal enclosures
- [ ] Pamphlets / Brochures
- [ ] Workshops
- [ ] Other (please describe)

<table>
<thead>
<tr>
<th>Does your zoo currently have available or offer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. School education (educator provided by the zoo, a formal program)</td>
</tr>
<tr>
<td>[ ] Yes</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| 23. School teacher professional development | [ ] Yes | [ ] No |
| 24. Animal feeding demonstrations with verbal presentation | [ ] Yes | [ ] No |
| 25. Zoo keeper talks (other than animal feeding demonstrations) | [ ] Yes | [ ] No |
| 26. Animal presentations or shows (such as a bird of prey free flight demonstration) | [ ] Yes | [ ] No |
| 27. Animal Contact Area (where visitors can touch or interact with animals) | [ ] Yes | [ ] No |
| 28. Docents (volunteer tour guides) / Guides / Hostess | [ ] Yes | [ ] No |

29. Is there any education available or offered at your zoo other than those listed above?
- [ ] Yes
- [ ] No

30. Please specify what other education is available or offered at your zoo:

http://learnapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa/wa/xdxCTGjJtT1zwgP90D8gj/10.0.1.22.3.1.19

Page 1 of 1
You have completed 91% of this survey

Design of your Zoo's education programs or mediums

31. When creating educational materials (including school programs, educational mediums or graphic interpretive signs for animal enclosures) does your zoo determine specific objectives for the educational experience?
   - [ ] Yes
   - [ ] Sometimes
   - [ ] No

32. Who determines any specific objectives?
   - [ ] Director / Manager / Owner
   - [ ] Zoo Committee
   - [ ] Senior Staff
   - [ ] Educational Staff
   - [ ] General Staff
   - [ ] Other (please specify)

33. How are those objectives created and defined?
   - [ ] General discussion and consensus
   - [ ] Given as a directive
   - [ ] Linked to mission statement
   - [ ] Linked to school curriculum
   - [ ] Other (please explain)

34. Are there any measures used to assess whether those specific objectives have been met?
   - [ ] Yes
   - [ ] No
   - [ ] Sometimes

35. Please explain what those measures are:

   

http://itemapps.murdoch.edu.au/cgi-bin/WebObjects/MISS.awa/2/wo/x09zg7CjJfTizwqPPDN/Lg/11.0.1.22.3.1.1.19

Page 1 of 1
Implementation of your Zoo’s education programs

36. Does your zoo have dedicated education personnel?
   - Yes
   - No
   - Sometimes

For the personnel responsible for delivering your zoo’s education, are they required to be........

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Not Relevant</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

37. Qualified teachers?
38. University graduates?
39. Trained entertainers / actors?
40. Committed to conservation and wildlife?
41. Passionate about animals?
42. Enjoy working with children?

http://learnapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa/wa/2/wo/xDz5TC3iTi2zq/PI6DN9jg/12.0.1.122.3.1.1.19

Page 1 of 1
### Implementation of your Zoo's education programs

**Are your Educators assessed on their ability to -**
(Please select those relevant to your zoo)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not Relevant</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>43. Memorise program content</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>44. Accurately portray the zoo's mission and purpose</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>45. Engage an audience</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>46. Motivate interest in zoo activities</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>47. Entertain an audience using theatrics</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>48. Use voice modulation</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>49. Use props and actions for emphasis</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
You have completed 80% of this survey

50. Does your zoo collect information from teachers or students after they have visited your zoo?
    - Yes
    - No
    - Sometimes

51. What type of information does your zoo collect from teachers, students or visitors who have participated in an education program within your zoo?

52. In what way is the information used to adapt or alter an education program?

53. How does your zoo determine the value of a zoo visit or educational program, from the teacher/student perspective?
You have completed 90% of this survey

Your Zoo's visitors

54. Do visitors come to your zoo to LEARN?
   - Yes
   - No

Consider the statement "Visitors come to our zoo to learn about...?" and select a number you believe best reflects your zoo's visitors.

"Visitors come to our zoo to learn about........

<table>
<thead>
<tr>
<th>Least Important</th>
<th>Average Importance</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>55. Animal biology and ecology</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>56. The conservation status of animals</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>57. The role of humans in environmental problems</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>58. What they can do to help save the animals</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>59. What the zoo is doing to help save the animals</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

60. Please specify what else visitors come to your zoo to learn about.

61. What information have you used to determine the answers given above to questions 54 - 60?

62. If you indicated that visitors come to your zoo to learn, how and in what form does the zoo provide an education to those visitors (please be specific)?

63. Do you have any other comments about zoo education or zoos in general?

http://learnapps.murdoch.edu.au/cgi-bin/WebObjects/MOSS.woa/2/wo/xDx2TG/3dT3s2wqPNsDNTyq/15.0.1.22.3.1.19

Page 1 of 2
1. What do you believe are the most important activities for your zoo?
   1. What do you believe is the most important activity or role for the education department (formal and / or informal)

2. Do you think that general visitors come to your zoo with an expectation or hope of learning or teaching their children something?

3. Informal education is often considered education by stealth, sneaky education for the general public – why do you think this is the case?

4. What mediums does your zoo use to educate the general visitors, what would be the main point of communication between the zoo and its general visitors?

5. What formal measures or evaluation procedures have you taken to determine the effectiveness of these mediums?

6. Please explain, in your own words, what it means to evaluate an education program or medium.

7. How many zoo staff are trained to formally evaluate education programs or mediums (or are external consultants used)?

8. How often is the process of evaluation used (some, most or all of the programs and mediums)?

9. Please explain the process of developing your formal education programs – for school children.
   - Conceptual / Are measures determined at the start
   - Creative
   - Application
   - Measures of success / evaluation (children / teachers / presenter reflection)

10. Please explain the process of developing your informal education experience – for the general visitors.
    - Conceptual / Are measures determined at the start
    - Creative
    - Application
    - Measures of success / evaluation

11. In your personal opinion, how could these processes be improved – what information do you believe would further enhance the development and delivery of educational programs or mediums?

12. Does your zoo have keeper talks for the general public?
13. Discuss – why / why not
   ☐ What is the purpose of the talks?
   ☐ In what ways do you believe that the introduction of keeper talks would benefit or enhance education within your zoo?

14. What are your thoughts on the concept that many zoos are currently implementing an ecosystem approach to zoo education, rather than focusing on a single species?

15. What are your thoughts on the idea that zoos should include the human element within its exhibits, to demonstrate the impact (both good and bad) that humans have had on the environment – for example, exhibiting monkeys living in an urban environment; or elephants working within a logging coupe; or owls sleeping in barns.
   ☐ Thoughts on this bringing humans closer to animals
   ☐ Thoughts on keeping animals in natural environment

16. If you had the funds and time to research zoo education – what type of information would you want and what would you do with it?
   ☐ How would you collect the data (online, paper, email, in person)
   ☐ Where would you publish results?

17. Any other comments?
Appendix 7: Case Study Zoo Visitor Questions

1) What Country and City or Town do you live in?
2) What is your age? 18 – 30 31 – 40 41 – 50 51 – 60 61 +
3) Male  Female
4) Why did you come to the zoo today?
5) What did / do you hope to learn or discover during your zoo visit?
6) Zoos have many different roles within the community, how important do YOU think the following roles are, what priority do YOU think the zoo should give the following?

<table>
<thead>
<tr>
<th>Role</th>
<th>Very low priority</th>
<th>Low priority</th>
<th>Average priority</th>
<th>High priority</th>
<th>Very high priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) A place to conduct captive breeding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b) A place for visitors to see local animals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c) A place for visitors to see animals from other countries</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d) A place for visitors to learn about animals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e) A place for visitors to learn about conservation issues</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f) A place for school children to learn about animals and conservation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g) A place for all visitors to learn about the zoo’s role in conservation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h) A place for all visitors to learn about their own role in conservation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i) A place for people to relax and socialise</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>j) A place to raise funds for conservation work in the wild</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>k) A place for educating visitors about actions they can take at home to help conservation efforts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7) What other activities or roles do YOU believe are important for zoos to be involved in?
8) Did you listen to a talk today?
   Yes
   a. How would you rate the experience (1-10)?
   b. Why did you rate it that way?
   No
   c. Do you believe a short talk by a zoo keeper would have enhanced your zoo experience? No / Maybe / Yes

9) How would you rate the general visibility of the animals, how well you could see them in their enclosure? Very Poor / Poor / Good / Very Good / Excellent

10) If you couldn't see a particular animal, did you read the information provided about that animal? Yes / No / Not Sure

11) If you did see the animal, did you read the information provided about that animal? Yes / No / Not Sure

12) How many of the signs did you read?
   All / Most / Half / Some / None

13) What interesting information did you see or read on the signs?

14) If you didn't read all or any of the signs, why not?

15) What type of information should the zoo provide at each enclosure?
   What do you want to know?

16) How could the zoo improve the way they give you the information?

17) How important is it that zoos educate visitors like you (1 – 10)?

18) Which animal enclosure was the best today?
   Why?

19) Before today, how many times have you participated in a zoo survey?