

ize

INTERNATIONAL ZOO
EDUCATORS
ASSOCIATION
JOURNAL

50/2014



The IZE is an association dedicated to expanding the educational impact of zoos and aquariums worldwide. Its mission is to improve the education programs in the facilities of its members, to provide access to the latest thinking, techniques, and information in conservation education and to support excellence in animal care and welfare.

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Journal of the International Zoo Educators Association Number 50 - 2014

Mission: to improve the education programs in the facilities of its members, to provide access to the latest thinking, techniques, and information in conservation education and to support excellence in animal care and welfare. IZE facilitates communication and professional development among zoo/aquarium educators and supports liaison with related organisations such as WAZA (the World Association of Zoos and Aquariums), IUCN, in particular the IUCN/SSC-CBSG (Conservation Breeding Specialist Group), and others.

IZE Journal: ISSN 1040-5208. The IZE Journal is published annually. Views expressed are not necessarily those of the IZE. The IZE Journal is printed and circulated to IZE members. Past issues are made available via the association's website: www.izea.net

Printed on FSC paper & with vegetable dyes.

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Submissions: The IZE welcomes articles by zoo and aquarium educators from across the world at any time. Final deadline for the next issue is 31st March.

To submit an article please contact the appropriate regional editor. Contact details on the back cover.

Editor: Stephen Woollard

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From the IZE President, Rachel Lowry

I'd like to thank those of you that took the time to submit journal articles this year. Once again due to your efforts we've managed to capture a snapshot of the many great zoo-based conservation initiatives and learnings from the many different corners of our world.

2013 was a big year for the International Zoo Educators Association. We secured a record number of institutional memberships which allowed us to not only increase our support and number of grants awarded through the 2014 Sponsored Delegate Program (allowing 12 zoo-educators to attend the 2014 IZE conference that could not otherwise afford it), but we were also able to trial an in-country training program for our Latin American membership which received terrific feedback thanks to the efforts of Sandra Gomez (Santacruz Zoological Foundation) and Maggie Esson (Chester Zoo).



My first term as President has consolidated that this really is a privileged position to hold. I've particularly valued the opportunity to see and hear about the many learning experiences and conservation focussed campaigns popping up in zoos and aquaria that utilise behaviour change strategies to benefit wildlife. I'm continually inspired and amazed by how powerful our learning experiences can be when we know exactly what we want to achieve. As such, I believe that the upcoming conference to be hosted by Hong Kong Ocean Park will help to boost our collective capacity even further. We have nothing to lose and everything to gain from designing programs that all us to evaluate our programs against target attitudes, knowledge and behaviours. And as we continue to network and take the time to learn from areas such as environmental psychology and community based social marketing, I have no doubt that we'll continue to hone our focus in on the challenges set by the United Nations Decade on Biodiversity and grow our reach and impact.

It's terrific to see the World Association of Zoos and Aquariums (WAZA) make some significant inroads in leading and publishing a global evaluation of biodiversity literacy in zoo and aquarium visitors (Moss et al) this year, which clearly demonstrates that zoos and aquaria are contributing to the goal of developing an eco-literate society. Fortunately, WAZA recognise that there is a long road ahead in the fight against extinction, and that education is a vital tool. Consequently, I must thank them for their donation to the IZE sponsored delegate program. We were able to sponsor an additional educator thanks to their generosity.

I can attest to the fact that the IZE board work hard to ensure that we serve you and our mission effectively. One of our recent milestones will be launched at the upcoming conference, where we will officially share with you our new logo, voted in by membership and designed by the talented team at San Diego Zoo Global.

With the conference in September firmly in our sights, I am aware that now is as good a time as any to encourage you to **renew your membership with IZE**. If you haven't done so already, please do introduce yourself to your regional representative (www.izea.net) and be sure to share your ideas on how we can better support you in delivering experiences that influence attitudes, knowledge and behaviours to benefit wildlife. I truly do appreciate your support of IZE and look forward to serving my final term as President before handing over to the very talented and driven Isabel Li from Hong Kong Ocean Park in 2016.

I hope to see you soon!

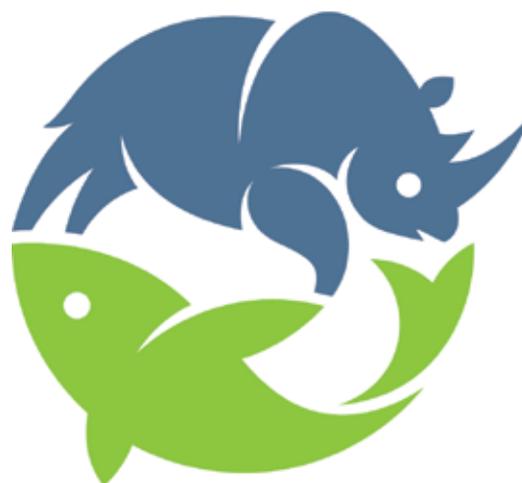
Rachel Lowry

President International Zoo Educators,
Director Wildlife Conservation and Science, Zoos Victoria

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INTERNATIONAL ZOO
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From the Editor

Stephen Woollard

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This issue of the IZE journal proves that the profession of “zoo and aquarium education” is alive and well, and is grasping the challenges of developing engagement, excitement, inspiration, learning, emotions and behaviour change.

Thanks to the team of IZE regional representatives for gathering these articles from across the globe - truly demonstrating our international reach and scope. And special thanks to Jane Satchell, Senior Designer, Zoos Victoria, for redesigning the Journal's cover.

At a time when there are on-going and increasing pressures on the natural world, and upon people and their day to day lives, our work is more important than ever. Sometimes, we may over-emphasise the scientific information or the desperate need for conservation, and forget that we need to engage the emotions and start with developing a real appreciation for wildlife and nature that leads to people wanting to know more, to do something, and to actually do it. So it is fitting that this journal includes a diversity of articles covering such aspects of our work.



*self portrait Anthony Van Dyck
(National Portrait Gallery, London)*

On a recent visit to London's National Portrait Gallery I contemplated the question of “**What is something worth?**”. The gallery is proudly displaying a self-portrait of Sir Anthony Van Dyck, painted 1640-41, that has been ‘saved for the nation’ by generous donations to enable it to be purchased for £10 million (US\$ 17 million).. and this is by no means an unusual ‘price’ for many works of art (many of which now fetch tens of millions).. the Gallery's collection must be valued at many billions, and there are many similar collections in the major cities of the world.

So what is it that encourages people to donate money to save a unique piece of art? And we must remember these donations get little more than ‘thank you’ in return, except for the good feeling of saving the artwork, and being able to see it.

What therefore is the value of an Amur leopard, Bali starling, Round Island skink...? We should not equate them to paintings, but their worth must be measured as equally or more important, and beyond financial terms, such that saving them for ‘the world’ is worth the price, whatever that may be.

The IZE Journal may not be a work of art, but it is a valuable asset and one that we hope you will share with others in your organisation, and not just with those directly working in ‘education’.

As this, the 50th issue of the IZE Journal goes to press, we are preparing to meet in Hong Kong and one of our strengths is that we happily share our experiences, ideas and practice and learn from one another. Obviously not everyone can attend our biennial conference, so don't forget that our website is freely available to everyone, wherever you are, and it features past issues of the journal and other resources. Happy reading... and hopefully you are inspired to write for the next journal - contact your regional representative to submit articles.

Stephen Woollard,
IZE Editor,
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Conservation Connections Matter!

Martha Parker, Conservation Education Coordinator, Houston Zoo, USA

Abstract

Zoos and aquariums play a powerful role in saving species in the wild while educating the public about wildlife and wild places through our ambassador animals. Employees are an integral part in bringing their institution's conservation efforts to the forefront, educating guests and inspiring them to take action to save animals. Recent research has shown that connections to field conservation projects by employees significantly impacts institutional conservation messaging.



Houston Zoo Carnivore Keeper, Angie Pyle connects with the Niassa Carnivore Project in Mozambique and has created an innovative on-grounds educational program in Houston to raise awareness about the decline of wild lions.

Photo courtesy of Dale Martin, Houston Zoo.

Introduction

Zoos and aquariums have come a long way since their inception in the 1800s, when institutions collected and held species in captivity for research, profit and visitor recreation (Turley, 1999). Today, zoos and aquariums are evolving into wildlife preservation and education centers that promote conservation messages through fun, recreational and inspirational experiences (Ballantyne, Packer, Hughes & Dierking, 2007; Falk et al., 2007). This shift in institutional mission and operations began in the late 20th Century in response to dramatically decreasing wildlife populations and habitats, and continues to evolve today (Ballantyne et al., 2007). To remain relevant, zoos and aquariums must maintain financial and cultural investments in conservation, combining enjoyable and educational experiences with conservation work (Rabb, 2004).

Zoos and aquariums have enormous potential to preserve species and habitats globally. Over 700 million people around the world visit zoos and aquariums every year, allowing staff at these institutions to message conservation issues and actions to an enormous population (Gusset & Dick, 2011). Beyond education and outreach, worldwide zoos and aquariums impact conservation financially, spending 350 million US dollars annually to save wild species (Gusset & Dick, 2011). Unfortunately, financial support alone will not suffice in protecting wildlife and wild places.

Human behavior must change for conservation to succeed. Zoos and aquariums are uniquely positioned to create this behavior change among their many visitors.

Zoos and aquariums can change behavior by inspiring and educating guests during their visits (Ballantyne et al., 2007). Using ambassador animals and offering engaging and educational talks have effectively influenced public attitudes about conservation (Ballantyne et al., 2007; Davison, McMahon, Skinner, Horton, & Parks, 1993; Fuhrman & Ladewig, 2008; Hutchins, Smith & Allard, 2003; Swanagan, 2000; Yerke & Burns, 1991). Interactive visitor experiences enhance guests' learning and increase attitudinal change (Moscardo, Ballantyne, & Hughes, 2007).

Research has proven that personal experiences with animals and their caregivers impact conservation knowledge and attitudes measurably (Falk et al., 2007). Zoos' and aquariums' ability to educate large populations about the power of collective action in conservation is most powerful when it involves animal encounters (Packer & Ballantyne, 2010). Further, encounters are more influential when staff integrates meaningful information into visitors' past experiences and the problems they comprehend (Ballantyne, Crabtree, Ham, Hughes & Weiler, 2000; Moscardo, 1999). Zoo and aquarium staff must connect with visitors to successfully deliver conservation messages (Ham & Weiler, 2002). To do that, staff must be knowledgeable and confident about conservation in their own institution to effectively deliver this information to the public. The purpose of this study was to measure the impact (and potential impact) of connections between field conservation projects and zoo and aquarium (zooquaria) employees. It was hypothesized that a connection to a field conservation project by zooquaria employees would improve their work ethic, ability to message conservation issues, passion for wildlife and conservation, passion for current position, and interest in making conservation more apparent in his/her institution.

Materials and Methods

To investigate whether zooquaria employees with direct connections to field conservation are more engaged in their work than those without connections, I developed and employed an online survey (Survey Monkey, 2013). For study purposes, field conservation projects were defined by work to preserve species in the wild. Surveys were distributed through personal emails, social media and university networks. Skip logic allowed for two primary respondent groups (those with and without field connections) to answer questions tailored to their experiences. The survey's 32 questions included open-ended, multiple choice, and Likert-like scale items.



Houston Zoo Facilities Department staff member connects to local sea turtle conservation efforts through installation of awareness signs on local beaches. Photo courtesy Ryan Draper, Houston Zoo.

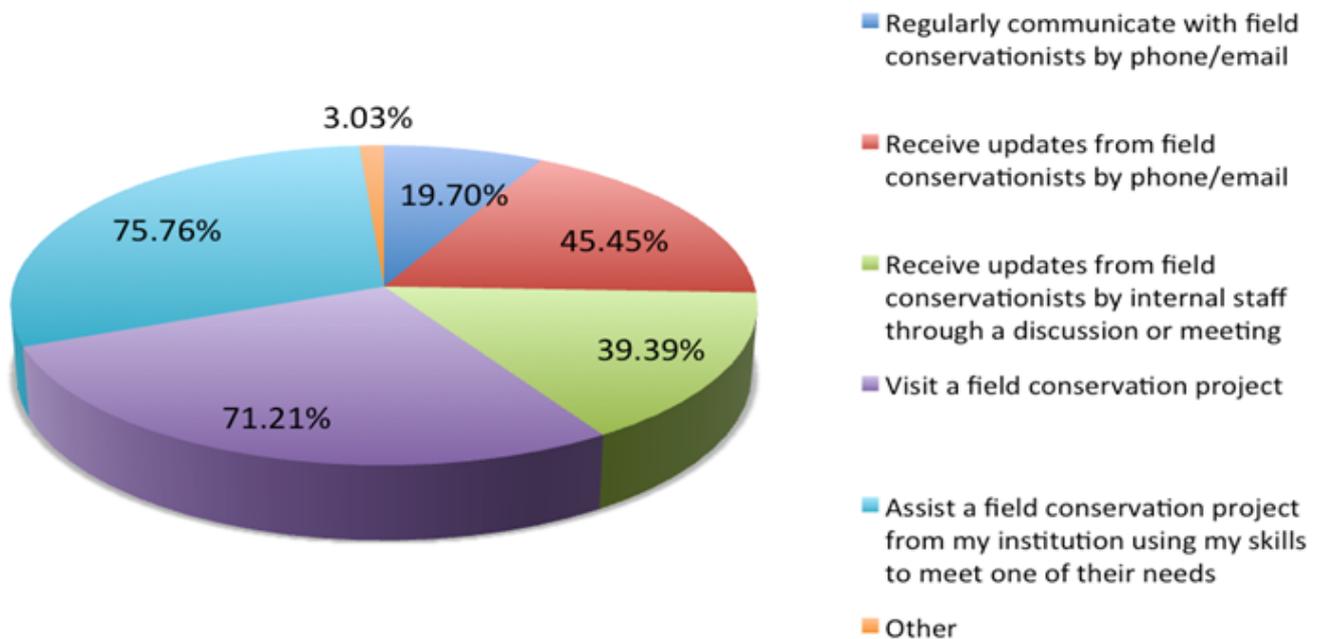
Results

Among 272 total responses: 64.71% of people had connections to field conservation projects and 35.29% of respondents did not. Of the connected staff; 46.32% had visited a field site at least once, 34.56% had continuous communication with a project and had acted to benefit the project/species, and 33.46% had organized or hosted a fundraiser for a project. Zoo employees (72.73%) comprised the majority of respondents, with 21.93% employed by institutions considered both zoos and aquariums and 5.35% employed by aquariums. The prominent accrediting organization Association of Zoos and Aquariums (AZA) oversees 94.09% of zoo and aquarium respondents' institutions. Almost half (48.68%) of respondents had served their institutions for at least 5 years. Animal keeper/curator and education/volunteer staff described the largest respondent populations, but respondents represented over 20 department types. Both subsamples (with and without connections) were asked whether opportunities for conservation project involvement exist at their institutions and whether these opportunities have institutional funding. Out of 192 respondents, 83.33% confirmed that opportunities for involvement exist, and 65.59% of respondents in the following question stated that their institutions fund such activities.

Respondents Without Field Conservation Project Connections

When asked about their desires to connect with projects, 71.05% replied affirmatively. Open-ended responses regarding potential contributions and obstacles to field projects captured qualitatively; 55% mentioned public outreach and education efforts, with time and money posing the biggest obstacles.

Involvement Interest Areas from Non-Connection Respondents (n=66)



Involvement Interest Areas from Non-Connection Respondents (n=66). Participants selected the way(s) in which they would like to become involved with field conservation projects.

Respondents With Field Conservation Project Connections

Of the 272 total respondents taking this survey, 64.71% of people had connections to field conservation projects. Respondents' field connections involved diverse species and geographies including coral reef restoration in Indonesia, Eastern-barred bandicoot recovery in Australia, orangutan conservation in Borneo, and reintroduction of ground squirrels in Idaho. Project sites ranged from North and South America to Africa and Asia.

The majority (85.53%) of respondents connected with field conservation projects through current or previous institutions; 72.37% have visited project sites. The most frequently reported time spent at sites was a few hours and between 1 and 2 weeks. Among those with connections to field projects, 70.73% responded that they had worked additional hours outside of normal responsibilities to facilitate the connection.

Respondents who confirmed connections to field projects were asked whether they were subsequently more excited, passionate and engaged in their work since developing that connection, and 53.66% responded affirmatively. Respondents reported communicating conservation messages more clearly (mentioned in 25% of responses), building broader professional networks (mentioned in 24% of responses), and understanding conservation issues and processes more completely (mentioned in 18% of responses).

Comparison Between Connection and Non-Connection Respondents

Each respondent ranked him or herself on several parameters: work ethic, ability to message conservation issues to the public (including fellow staff and guests), passion for wildlife and conservation, passion for current position, and interest in making institution's conservation efforts more evident. Those with a connection to a field conservation project ranked themselves on these parameters twice, once reflecting their roles prior to connection development and again reflecting time of survey. Ranking choices for each topic included very poor (1), poor (2), fair (3), strong (4), and very strong (5). Averages were calculated for each topic and compared between respondents in two ways. The first comparison was between those without a connection to a project and those with a connection to a field project, and the second comparison was between the retrospective and current rankings for those who have project connections. Paired t-tests were used for each comparison.

Respondents without connections were asked whether a connection would change self-ratings in any of the 5 areas of self-assessment. The most frequent responses to this open-ended question included increase in passion for current job (22% of responses), feeling more involved and/or knowledgeable about conservation (23% of responses), and improved ability to message conservation topics to others (30% of responses).

Impacts of Conservation Connections

Results demonstrate that zooquaria employees' connections to field conservation projects improve their work ethic, ability to message conservation issues, passion for wildlife and conservation, passion for current position, and interest in making conservation more apparent at their institution. Respondents with connections scored themselves significantly higher in these 5 areas compared to their pre-connection self-ratings, and compared to those without connections. Results demonstrate that zooquaria employees with field project connections work additional hours (weekly) to support these efforts and are now more excited, passionate and engaged in their work than they were before developing their conservation link. Drivers for these improvements may include seeing the results of conservation work and how individuals can make a difference. Conservation connections may also help employees build useful professional networks, discuss and message difficult conservation topics, and understand conservation issues and processes more thoroughly.

Most employees with conservation connections formed their relationships through their workplace without visiting the project's field site. Of those employees who did travel to field sites, visits were typically short. This is an important aspect for zoo and aquarium executives to consider when creating more connections between their employees and conservation projects. Connections may not require field site visits, and if they do, extensive visits may not provide additional benefits. Respondents who visited field sites expressed interest in continuing their involvement with conservation projects. Means of continuation included working with other species (locally and abroad); receiving project updates; assisting with photo, video and social media outreach; fundraising; educational efforts; administrative tasks; designing field equipment; visiting the same site or other sites; and connecting their gift shop with conservation projects.

More than half of the employees with conservation connections felt "very strongly connected" to that effort and remain associated with the project through survey administration. Employees with conservation connections described their associations through a variety of means including fundraising, education, outreach, communication, marketing, research, habitat restoration, site visits, animal care and captive breeding. The types of connections employees have to conservation projects are diverse, however all forms are important.

The majority of employees without field project connections expressed the desire to establish them (71.05%). This involvement or connection can take many forms, and field site visits are not required to engage staff. Non-connection respondents were asked to identify desired connections and expressed

interest in assisting projects from their institutions using their skills (75.76%). This subset group felt that they could contribute many skills to a conservation effort including outreach and education, collecting data, conducting fieldwork, providing manual labor, analyzing data, organizing project logistics, and providing knowledge in a specific field. Non-connection respondents felt that a connection to a project would improve their ability to message conservation issues to others (including zoo and aquarium visitors), create more passion for their job, and feel more involved and knowledgeable about conservation in general.

Impeding Factors on Creating Connections

Respondents without connections described time and money as the main barriers to beginning work with a conservation project. Other barriers included lack of transportation, not knowing the correct people, minimal staff to share current job duties, lack of scientific knowledge, family obligations and health issues. If zoos and aquariums are to reap the benefits of having connected employees, they will need to develop a strategy that outlines a plan for these barriers.

Influence of Conservation Connections Beyond Employees

Creating conservation connections between zooquaria employees and field conservation projects is vital for long-term conservation efforts. Perhaps most importantly, field conservation connections can improve staff members' abilities to communicate conservation issues to others. This has far-reaching impacts beyond improving the employees' communication skills, as the guests receiving these messages will also benefit. With deeper understanding and increased excitement about conservation issues, zooquaria employees may have more confidence in their abilities to message conservation issues. Connections with field projects may also promote desire to market institutions' conservation efforts to the public. This is vital as zoos and aquariums work to situate conservation at the forefront of institutional mission and operations (Ballantyne et al., 2007; Falk et al., 2007). Staff interactions with visitors influences their experiences, so staff must tailor their information to meet audiences' needs, curiosities, and knowledge (Dierking et al., 2004; Orams, 1994). Employees in all departments of zoos and aquariums must be willing, able and eager to provide guests with tools to help save species and protect habitats (Ballantyne et al., 2007). By increasing inspiration, knowledge and excitement among staff through field project connections, zooquarias can enhance guest experiences and increase the likelihood that visitors will receive, understand, and internalize conservation messages.

Creating conservation cultures in communities begins internally. Significant effort should go to establish connections between employees and field conservation projects, as the potential benefits are enormous. These connections appear to have very significant impacts on zoo and aquarium employees. Relationships between field conservation projects and staff have the potential to greatly impact visitors, their experiences, and behavior among guests for the benefit of wildlife and wild places.



Houston Zoo Facilities Staff Member Brandon Patterson with Painted Dog Conservation (PDC) Dr. Greg Rasmussen. Brandon became connected to PDC after a site visit to help with construction in Zimbabwe and now assists the project from the Houston Zoo by designing anti-snare radio collars for the dogs. Photo courtesy of Dale Martin, Houston Zoo.

Acknowledgements

Many thanks go to the Houston Zoo for their support of this research and providing valuable networking needed to disperse this study across the globe. Thank you to Carol Trosset, the Director of Enrollment Research at Bennington College for her assistance in developing data analysis categories for this study.

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Learning effectively outside school with the help of a “Zoo School”

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Introduction

What would the learning process entail in an educational programme outside school that wants to address knowledge, emotions and attitude at the same time? Opinions about the relationship between knowledge on the one hand, and environmental attitudes and ecological awareness on the other hand, vary considerably. However, many researchers assume that an important positive relationship actually exists (Barraza and Walford, 2002; Bogner, 1998; Kaiser et al., 1999). The rationale behind this assumption is that ‘we can only protect what we know’. Furthermore, we can only miss a species if we have had some kind of attachment to it (Fawcett, 2002; Lindemann-Matthies, 2002). Precise knowledge about the biology and ecology of living creatures is especially important in order to create an emotional bond with plants and animals as well as to foster appreciation for the environment (Mayer, 1993).

Another important factor for an educational programme outside the classroom is the direct encounter with the animals. Direct contact with the living environment helps to enhance ecological awareness, positive environmental attitudes and a caring approach towards living creatures (Haase, 2003; Lock, 1998; Yore and Boyer, 1997). Winkel, a pioneer of environmental education, emphasized the importance of an emotional encounter with living creatures to promote environmental ethics even before the importance of sustainable development was discussed. He stated that the behaviour of human beings was only partially determined by knowledge, and that values, conscience and morale played an equally important role. While values and feelings cannot develop without knowledge, taking or avoiding action, caring for something and adopting a gentle approach are inspired by feelings that come from within – from the heart, so to speak (Winkel, 1995). Learning outdoors could be the most effective and, at the same time, the most pleasurable way to teach children about various species and biodiversity. This approach should, in fact, be adopted more often (Lindemann-Matthies, 2006). Furthermore, biology lessons can be made more enjoyable by studying living plants and animals at first hand (Barker et al., 2002; Lock, 1998).

With these ideas in mind, learning in the “Zoo School” is organised in such a way that students have the possibility to encounter, touch and handle different

animals (e.g. corn snake, dumpy tree frog, central bearded dragon, stick insect, giant millipede), and what they observe will be explained and put into context. Questions that arise from these encounters will be addressed immediately: e.g. evolution and relatedness, differences between vertebrates and invertebrates, home territories and natural habitats.

Some presented animals are -perhaps not only at first sight- associated with feelings of disgust and abhorrence. These negative emotions pose a genuine obstacle for an effective ecological education (Bixler et al. 1999) or education in sustainable development. Many species are essential for our ecological system, yet many of them are classed as endangered species or on the brink of extinction (Bixler et al., 1999; Wilson, 1987). The extinction of species has been dramatically accelerating, and it is difficult to predict the outcome (Rockström et al., 2009). There is an obvious need for an educational programme that raises interest in and knowledge of living beings, eradicating any negative emotions, such as disgust, along the way.

Some of the goals of the “Zoo School” (e.g. to expand knowledge of and to develop positive emotions towards different animals) were evaluated in this study. In previous studies it could be shown that learning outside school has short- and long-term effects on children’s attitudes towards especially small animals (like insects and other invertebrates), and motivates them to learn more about these animals (Drissner et al., 2008; 2010; 2013). This study investigates if the “Zoo School” as a learning forum creates similar long-term effects on emotions towards and knowledge of different animals (vertebrates and invertebrates).

Methods

Participants and design

210 secondary students (grade 5 and 6), 108 who had visited the “Zoo School” before (intervention group), were asked to write an essay about vertebrates and invertebrates. The instruction given was: “What do you know about the vertebrates and invertebrates? Please describe.” The students of the test group visited the “Zoo School” up to four months before (min. 2, max. 4 months). 102 students from the parallel classes (same school, same grade)

served as control group; that is intervention group and control group learned in the same school with the same biology teacher.

The essays were evaluated in line with the methodology developed by Drissner et al. (2008) by categorizing for the following aspects (examples given are actual answers of the students):

(1) number of scientifically correct statements (conceptions): e.g. fishes, amphibians, reptiles, birds, mammals are vertebrates; invertebrates have an exoskeleton

(2) number of misconceptions (scientifically incorrect statements): e.g. most invertebrates have a smooth integument; the corn snake has an exoskeleton

(3) number of positive emotions: e.g. vertebrates are extraordinary; invertebrates are fascinating

(4) number of negative emotions: e.g. invertebrates are disgusting and slimy

Some statements and written sentences could show how exactly students are able to describe the activities at the “Zoo School”:

“During the lessons we had the possibility to touch various animals; the giant millipede seemed to be tough compared with the dumpy tree frog.” (girl, grade 6, test group),

“We could touch living vertebrates and invertebrates; one could feel the exoskeleton of the giant millipede and also the endoskeleton of the corn snake” (boy, grade 6, test group).

Results

The students who visited the “Zoo School” wrote more scientifically correct statements (conceptions), showed better knowledge of (difference between correct and incorrect statements) and more positive emotions (difference between positive and negative emotions) towards vertebrates and invertebrates than the control group.

The study also showed that the boys as well as the girls of the test group wrote more scientifically correct statements (conceptions) and showed a better knowledge of the animals than their peers (control group).

Discussion and Conclusion

The children who attended the “Zoo School” displayed in an essay about animals (vertebrates and invertebrates) a better knowledge of and more positive emotions towards them. While intention of the programme was to bring about such differences, it cannot be taken for granted that the “Zoo School”-experience must necessarily bring about these positive changes. An educational programme that helps to improve the knowledge of and the emotions towards various animals is very important in light of the increasingly smaller number of children estimating the value of different animal-species correctly (Lindemann-Matthies, 2006; Snaddon et al. 2008; Wagler and Wagler, 2011).

These results support a previous study with older students and a similar design: Drissner et al. (2008; 2013) could show that differences in knowledge and emotions of students who did or did not visit the “Green Classroom” - also a learning forum outside school in the Botanical Garden of Ulm - could be found years after the visit. In that study, the essays of 119 and in a second study of 102 secondary students were evaluated using the same criteria as in the present study. The students who had visited the “Green Classroom” demonstrated better knowledge of and more positive emotions towards the animals, even though it had been five years since the visit for some of the students.

The positive results (e.g. better knowledge and emotions towards animals) noted in the intervention group but not in the control group are remarkable considering the duration of the visit. The students only attended the “Zoo School” and also the “Green Classroom” for half a day. This is extremely short-term participation. According to other studies conducted to date, short-term participation takes at least a few days, possibly even weeks, in order to have any impact (e.g. Bogner, 1998; Haase, 2003); this is a considerably longer time length by comparison. So far, it has been assumed that environmental programmes aiming to change attitudes need to be continued for at least several days. The fact that some positive changes not only in knowledge but also in emotions have been recorded from a half-day teaching-programme could reflect the importance of the educational work in a learning forum outside school. One should note that such short programmes can be more easily integrated into the curricula, and they can be prepared for and reflected on accordingly by the students within the classroom setting. In Germany, it is rather unlikely that schools and teachers can find the time to spend more than one half-day outside of the classroom investigating just one phenomenon. For these reasons, it was interesting to see if a programme of such short duration has any impact on the knowledge and opinions of the students.

The results of this study suggest that the outdoor setting of an educational programme can have a valuable formative influence, helping to expand long-term knowledge and to develop emotions towards specific animals that could lead e.g. to a more positive attitude towards these animals and their importance.

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A new logo for IZE

We are delighted to have adopted a new logo for IZE.

Our previous 'rhino' logo served us well and so the IZE Board were very careful in putting forward a brief to modernise and update our image and retain some of our previous identity, and be a logo that can be reproduced in colour and black and white.

A number of designs were created and the Board drew up a shortlist to present to the Association's membership for comment and selection.

The new logo, as you can see, still features a rhino but has the addition of a fish to illustrate that we are an association for education about all taxa represented through zoos, parks and aquariums. The colours chosen represent life, water, plants and the interdependence of these and wildlife. The design also 'references' the WAZA logo, and hopefully thereby illustrates our connection into the world zoo and aquarium association.

So, we ask that all of our members, and associations that reference IZE, use our new logo when updating information websites etc.

The 'Thinking Big' Elephant Project

Dr Maggie Esson¹, Andrew Moss¹ & Liz Pitchford²

¹Chester Zoo, UK

²Literacy Consultant, UK

Abstract

*Our Asiatic elephants (*Elephas maximus*) are a popular zoo exhibit and serve as a flagship for our insitu programme in Assam (the Assam Haathi Programme). The 'Thinking Big' elephant project involved primary schools from the socially and economically deprived district of Ellesmere Port, located close to the zoo in the north of England. Pupils and their teachers visited us to interview our elephant keepers, learn about our elephant herd and develop insight into the lives of people living in human elephant conflict zones in Assam.*

Schools reported low levels of literacy, and we developed a project to help raise standards of literacy, most especially writing. Pupils participated in teaching sessions in their schools where they were given a presentation of our work in Assam and profiles of our elephant herd in the zoo. Pupils prepared interview questions and met with our elephant keepers behind the scenes. Pupils then used this experience to develop persuasive texts, journalistic writing and diary entries. We surveyed and interviewed teachers, monitored pupils' work, recorded comments from pupils and their parents, and received feedback from our elephant keepers. Results indicate that pupils were motivated to write and teachers felt the pupils fully engaged with the project.

Project Description & Methods

Our Asiatic elephants, (*Elephas maximus*), (2.6), are a popular species in the zoo and their roles in the species collection plan are 'Insitu Ambassador' and 'Education.' Chester Zoo is a partner in the 'Assam Haathi Programme', a human/elephant field programme in Assam in Northern India, and both schools' and community education are key components of this project in-country. Chester Zoo staff are directly involved in this field project and consequently, our educators can speak with some credibility on this topic to schools local to Chester Zoo. Within our zoo catchment are areas designated as socially and economically deprived and we are keen to support schools in these areas. Teachers from some of these schools report low levels of literacy in 10 year olds (Year 5), especially amongst boys, and we sought to devise a point of engagement to motivate these pupils to read and write, and to help teachers raise standards of literacy.

The aims of the 'Thinking Big' elephant project were:

- To raise standards of literacy by engaging Year 5 pupils in a cross-curricular zoo-based activity
- To deepen pupils' understanding of the conservation work of Chester Zoo, both in the zoo and in the wider context
- To illustrate how we operationalize species collection plan roles through a schools' education programme using Asiatic Elephants as a case study

The 'Thinking Big' elephant project was devised in partnership with a schools' literacy consultant for our region and 300 Year 5 pupils and 50 teachers from ten schools participated over a period of six months. Background materials were prepared by zoo educators and these were designed to provide an overview of our Assam Haathi Programme, with a particular emphasis on how elephant

behaviour impacts on the lives of villagers, including children. We hoped that pupils would feel an empathy with their counterparts in Assam and this would provide a cultural insight.

Profiles of all our elephants, including behavioural and physical characteristics, were also produced to allow pupils to recognise individuals in our herd. The concept was that pupils would have an opportunity to compare and contrast attitudes towards our much-loved zoo elephants, with the fear and foreboding that wild elephants, raiding crops and destroying homes, can engender in Assam. We wanted to emotionally engage the pupils in order to inspire them to write.

We also wanted to offer choice in terms of the areas of the literacy curriculum that pupils chose to address: for example, researching using multi-modal texts, speaking and listening using interview skills, writing from different perspectives (a farmer, an elephant, and an Assamese child), journalistic reporting, and persuasive texts.



Life for children in an Assamese village. The smaller child's mother was killed by an elephant



The morning after a village elephant raid

Boys play dare-devil teasing a wild elephant



One focus of our work in Assam is addressing the issue of boys putting themselves in dangerous situations by teasing and using catapults to hurl stones at crop-raiding wild elephants in a show of bravado in front of their peers. We felt this would have a particular resonance with our Year 5 boys here in Chester.

The literacy consultant, teachers and their pupils participated in introductory sessions in the schools and this included preparatory work for zoo visits. During the zoo visits, pupils, in groups of 30, met with our elephant keepers, (briefed by our educators) in a behind the scenes visit. Interesting, this visit did not include any special access to our elephants, but did include access to one of our indoor paddocks while the elephants were outside. The keepers provided insight into their elephant management routine, including a demonstration of aspects of protective contact training. This included taking temperatures using a thermal imaging device, and sensing the power of elephants by rolling a boomer ball. These activities served to turn the experience into participatory learning and clearly inspired the pupils.

Pupils used their pre-prepared work to interview keepers and it was obvious from levels of concentration, that the keepers had a real impact on the pupils, including being seen role models. Keepers also appreciated that pupils had put some effort into preparing for the meetings and there was a sense of interest and excitement. Following this visit, teachers reported that they had sufficient materials to develop cross-curricular schemes of work that lasted a whole term in some cases.

Outcomes & Evaluation

An online evaluation survey was conducted with the participating teachers, and informal feedback was also collated from pupils, parents, carers and our zoo keepers. Written work from children was collected to evidence literacy attainment.

Some schools also chose to develop the theme into an art project, researching and reflecting the rich and colourful culture of Assam, including the Hindu tradition of honouring the deity 'Ganesha', whose elephant head makes him easily identifiable. This body of work resulted in the schools staging an art and literacy exhibition in the zoo.

Teachers were unanimous in their praise for the project, often citing the real, hands-on experience as a great catalyst for improved literacy. "Our literacy work could be written from real experiences, not just research"; and "Being allowed access to the elephant enclosure made everything very real". 62% of teachers responding to our survey reported that the 'Thinking Big' elephant project became part of a scheme of work and the zoo visit was not viewed as a stand-alone school trip.



Demonstrating how to take an elephant's temperature



Sensing the power of an elephant by rolling a heavy boomer ball

71% of teachers had visited the zoo before on a school trip, but recorded additional benefits as 'going behind the scenes' and having a focus. "The visit was much more focused, work had been done prior to the visit which was a huge benefit. The work that was done after the visit in literacy was amazing." The enthusiasm of the pupils was also highlighted by teachers as a great positive and that this improved learning. "Children's enthusiasm and levels of interest were greatly increased and they wanted to learn more. It encouraged independent learning". We asked teachers if this zoo visit had changed their understanding of what our zoo could offer school groups and 100% responded in the positive. "Being able to take part in a project like this gives far greater purpose to a visit and could lead to a greater number of shorter 'focused' visits rather than a one off 'visit to the zoo'."

In the feedback that keepers provided it was clear that they also enjoyed participating in the project and understood the value of this type of interaction "...it was easy to see that they [the pupils] had really thought about the elephants as individuals with personality which can make a real connection for people". Wider benefits of the project were also reported by some parents. "My child, who normally says he 'does nothing' in school, kept us listening for over two hours about elephants". One pupil, with behavioural difficulties and who is assigned a one-to-one carer, was included in the school trip after some discussion. The carer later reported the positive benefits of participating in the zoo visit. "The child I work with one-to-one has responded so positively, showing very few of the negative behaviours he normally displays in school".

Conclusion

The 'Thinking Big' elephant project shows the benefits that animal keepers and educators working closely together can bring to enrich learning opportunities in zoos. Opportunities like this one, to develop relationships across disciplines in zoos, yields benefits for educators. We feel we know more about the management of our elephant herd as a result of

planning this project and this learning will have other applications in our learning activities. We feel we have a stronger relationship with our elephant keepers and that they have a deeper insight into how effective zoo education can be and the part they can play in this.

We demonstrated that our elephants in the zoo can act as powerful ambassadors for our field programme in Assam. The charisma of the species and the privilege of stepping behind the scenes and engaging in conversation with our keepers provided the catalyst the pupils needed to engage them in reading and writing. As a result of this we feel we have planned and delivered an education initiative that fits well with the species' role in the collection.

The value, that zoo educators becoming involved in field programmes brings, is multi-faceted. Speaking from direct experience brings credibility and authenticity to teaching practice. Direct experience can provide educators with the insight to provide more than an explanation of conservation science. It can afford deeper insights into the lives of real people, the human dimension of conservation: and achieving deeper levels of engagement with our zoo visitors is what we all aspire to.



Maggie Esson & Liz Pitchford with the Assam Haathi art exhibition at the zoo

Connect and Protect: The Benefits of Flagship Species

Jeffrey C. Skibins, Assistant Professor, Kansas State University, USA

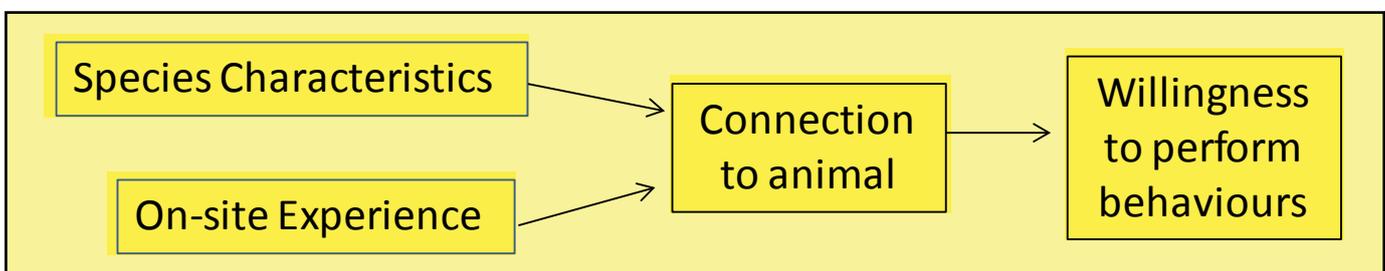


Traditionally, zoos and aquariums have relied on a select group of species to drive attendance. Popular species such as elephants, bears, great apes, and dolphins served to solidify institutions' roles as public attractions into the mid-20th century. However, as threats to biodiversity increased and habitats decreased, zoos embraced a more active role in conservation. The animals that once served to entertain the public were now being used to educate millions of visitors about the global extinction crisis.

Using an animal to highlight a threat to biodiversity and encourage public action to remediate that threat is the basis of flagship status. For example, elephants are used to discuss poaching, polar bears are linked to climate change, and orangutans demonstrate the effects of habitat loss. These species are highly effective in these roles because of their broad public appeal, or charisma. Visitors are innately drawn to these animals, in part, due to their appearance. Common descriptions of flagship species include 'cute' and 'cuddly', which

also explains their dominance in the gift shop. Another common feature of flagships is size. Bears, big cats, and rhinos are enormous animals. This has led to the label 'megafauna'. Linking cute and cuddly with enormous size, we get the overly academic term 'charismatic megafauna' to describe flagship species.

In many instances, charismatic megafauna are an excellent choice to anchor conservation campaigns. For example, the Melbourne Zoo's (Australia) 'Don't Palm Us Off' campaign and exhibit targets orangutan conservation. The focus is to raise awareness of habitat loss from palm oil production and increase participation in pro-conservation behaviours (e.g. avoiding palm oil products and donations). These efforts have been highly successful. Results show visitors are extremely satisfied with the exhibit and are significantly more likely to engage in desired behaviours upon exiting (Pearson et al. 2014).



But, are charismatic megafauna the only choice for flagships? Are not insects, amphibians, reptiles, and fish all subject to the same threats as pandas and tigers? Of course, the answer to the latter is 'yes.' And surprisingly, the answer to the former is a resounding 'no'. Zoo visitors are beginning to express a greater interest in a widening array of species. In a recent survey, more than 700 visitors were asked to identify the animal they felt the strongest connection to during their visit. Visitors responded with 164 distinct animals. Furthermore, regardless of which species a visitor identified with, the connection was a significant predictor of willingness to perform a pro-conservation behaviour (Skibins and Powell 2013).

Zoos and aquariums should feel empowered to deeply explore their collections for potential flagship species. Through purposeful interpretation and exhibit design, institutions can enable visitors to form a connection that extends well beyond the 'mammal house.' For example, visitors to the Shedd Aquarium (USA) identified jellyfish, over dolphins and whales, as the animal to which they most strongly connected (Skibins and Powell 2013). Zoos Victoria (Australia) has launched the 'Love Your Locals' campaign, which is examining visitors' connections to local species. The focus is on 20 endangered species found in Victoria including insects, amphibians, reptiles, birds, and mammals. And as demonstrated by the Leadbeater's possum (*Gymnobelideus leadbeateri*) none are charismatic megafauna.

After identifying a flagship species, the second step is to determine which behaviours visitors will be asked to perform.

Behaviours should link directly to the species and be capable of being performed while on site. The ability to act in the moment is a key feature to successful zoo flagship campaigns. Smith et al. (2011) point out the emotional peak of a zoo visit quickly fades and visitors may be less likely to act after departing. Cell phone deposit (Brookfield Zoo, USA) and wipe for wildlife (Melbourne Zoo), illustrated here, show how zoo visitors can immediately act to save wildlife.

By recruiting more species to act as flagships, zoos and aquariums can help visitors connect and protect an expanding spectrum of biodiversity. In turn, this can provide greater opportunities for partnerships with in situ conservation. Visitors are capable of forming a connection with an astounding assortment of species.

This connection has great potential to motivate action. Those actions, multiplied by the millions of visitors world-wide can change the course of conservation.

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Snakes are scary – or are they? A preliminary evaluation of the Dangerous Creatures Reptile Exhibit at uShaka Sea World, Durban, South Africa

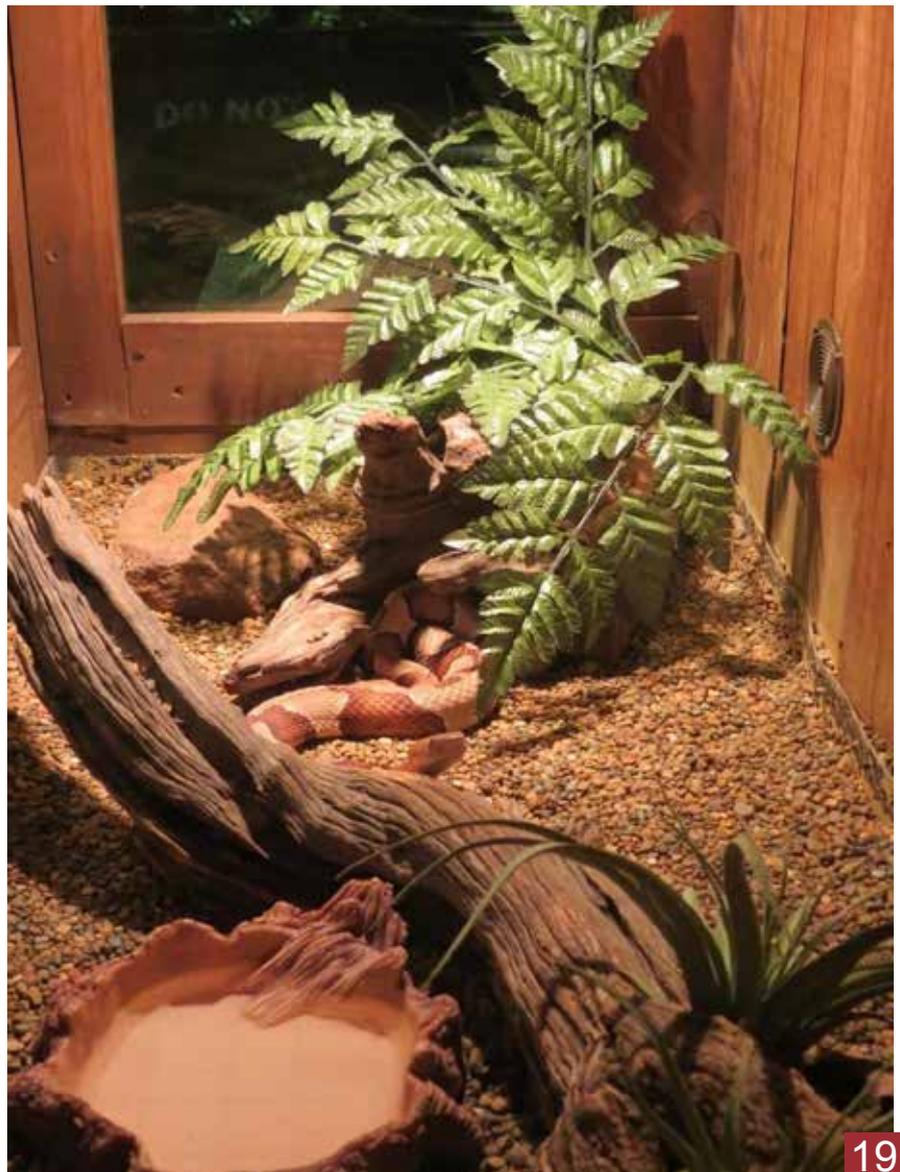
Judy Mann, CEO, South African Association for Marine Biological Research

A brief theoretical background

Zoos and aquariums have the capacity to influence large numbers of people with a strong conservation message, by providing opportunities for them to develop emotional connections with animals (Conway, 2007). Zoos and aquariums are found on every continent and in almost every country of the world, from wealthy first world cities to poor, war ravaged towns. While the animals exhibited in zoos and aquariums differ, the opportunity for visitors to view and connect with wild animals remains central. Even in poor cities in developing countries, enormous groups of school children visit the local zoo, as do families, with the zoo providing a much needed respite from the harsh realities of daily life. In the first world urban environment, zoos and aquariums provide city dwellers with a similar opportunity to relax with family and friends in a pleasant and safe environment. For both rich and poor, zoos and aquariums provide visitors with an opportunity to connect with nature (Rabb & Saunders, 2005) as they are able to reach across social, cultural and economic barriers to touch people throughout the world. This enormous reach comes with tremendous responsibility, and zoos and aquariums are increasingly challenged to prove their claims of contribution to conservation.

There are many areas of research which require attention before zoos and aquariums can confidently assert their true value to conservation. One such field is the potential disconnect between the visitor's motivation for a visit (entertainment) and the zoo or aquarium's mission (behaviour change through education). The relationship between education and entertainment in an educational leisure setting is very complex (Packer 2006; Packer & Ballantyne 2004) and the extent to which education and entertainment are conflicting or complementary is unknown. Previous research has shown that entertainment and education are synergistic and complementary in educational leisure settings (Falk & Dierking, 2000; Falk, Moussouri & Coulson, 1998; Packer & Ballantyne, 2004). Although visitors often identify recreation as their primary reason for visiting a facility (Serrell, 1977),

Packer & Ballantyne (2004) analysed data from six educational leisure settings and found that learning in a leisure setting is seen by the visitor to be integral to the enjoyment of the experience. Importantly they noted that visitors were more likely to invest effort in learning if it was perceived as fun and relaxing – 'you learn more when it's fun', and most importantly, that education was considered to complement the entertainment aspect of the experience – 'you enjoy it more when you learn' (Packer & Ballantyne 2004). Falk, Moussouri & Coulson (1998) noted that visitors with high entertainment motivations stayed longer in an exhibit, and that the duration of the visit was linked positively to learning. These studies indicate that entertainment and education are not mutually exclusive and that a zoo or aquarium should attempt to integrate these two aspects of their business



to facilitate learning while having fun. In fact, if entertainment motivations increase visit duration, and visit duration increases learning, then entertainment motivations are positive for the overall learning mission of the facility. It would appear that the perceived tensions between educational and entertainment motivations of visitors are largely academic, and that no such conflict exists consciously within a visitor (Falk, Moussouri & Coulson, 1998).

Dangerous Creatures Exhibit

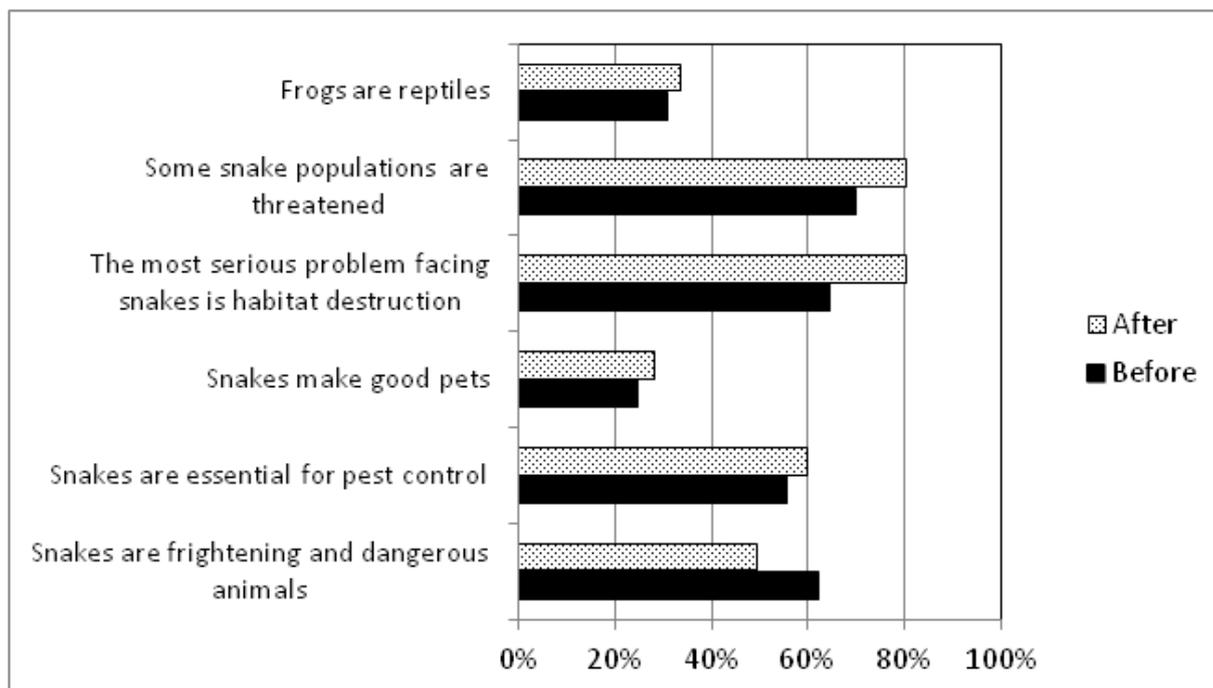
In 2006 uShaka Sea World departed from its traditional focus on marine animals and designed and opened a terrestrial exhibit. Filled with squeals of delight and fear, the Dangerous Creatures exhibit hall has fascinated guests with amazing animals displayed in an 'Indiana Jones' type exhibit since opening. The exhibit hall is over 300 square meters in size. The exterior has been themed to resemble a warehouse in a Zanzibari fishing village, with enticing peeks into the interior showing a tarantula and some king snakes. Visitors enter the "warehouse" and find themselves in a jumble of crates and boxes, discovering a host of beautiful, interesting and often dangerous animals. Following the winding path and ducking under ropes and crates creates a sense of excitement in the explorer, and a series of special effects ensures that visitors are startled at various points. This creates a sense of expectation, and the interaction with the effects and with each other creates considerable mirth. The exhibit houses a range of potentially dangerous animals, including 96 reptiles of 41 different species, 48 arthropods (spiders and scorpions) of 13 species and 39 amphibian species (frogs). Local creatures include the beautifully patterned gaboon vipers, the vibrant green mambas and the giant bullfrogs. The jewel-like poison dart frogs, plastic looking Whyte's tree frogs and cartoon like Argentinean horned frogs are all at home in their realistic exhibits.

As many of the world's frog species face extinction, the efforts of the uShaka Sea World team to breed these wonderful indicators of ecosystem health are increasingly important. One such conservation project is the Pickersgill's reed frog (*Hyperolius pickersgilli*) breeding programme. This tiny frog is endemic to the KwaZulu-Natal coast is classified as critically endangered, mainly due to the degradation of the coastal reed beds and wetlands that form its natural habitat. Breeding success has been achieved and the team will be working with the local nature conservation authority in a release programme.

The innovative and fun approach to theming, as well as the obvious care of the exhibits and the excellent husbandry of the animals has made this display a great success with guests. Since opening over 300 000 visitors have enjoyed the exhibit. The theme 'From fear to fascination' was used to describe the exhibit. Our aim was to help move visitors from their fear of the animals, to a fascination for the amazing creatures and an appreciation of their role in ecosystem functioning, as well as their vulnerability to people. We hoped that people would leave the exhibit more interested in the animals displayed, and more concerned about their wellbeing. However, the exhibit is also very entertaining and we were concerned that the high entertainment value would overshadow the more serious conservation messages that we wanted to convey. In order to answer our questions, a simple evaluation project was implemented.

Entertainment vs Education?

A total of 101 visitors completed a questionnaire after exiting the Dangerous Creatures exhibit. Slightly more males (52%) than females were interviewed. Most visitors were in the 30 – 39 age group (31%) and almost half of the visitors surveyed were from KwaZulu-Natal (53%). Only 10% of the visitors interviewed were international visitors.



Most groups comprised of five or fewer people and most people were visiting with their families, as 47% of the visitors were accompanied by children. A total of 36% were visiting for the first time, while 43% noted that they had previously visited a snake park at another facility. A total of 15% respondents were repeat visitors.

When visitors were asked why they had chosen to visit the facility, the highest rating was 'fun and educational', closely followed by 'It is something to do at uShaka'. Visitors appear to enjoy this exhibit, with 92% of visitors agreeing or strongly agreeing with the statement 'I enjoyed the exhibit'. Visitors also reported learning about reptiles and conservation. Over 91% felt that they had learnt about reptiles and 68% reported that they had learnt more about conservation. Interestingly, 53% felt that they had changed their minds about snakes after visiting the exhibit – from a more negative to a more positive view of snakes. Half of the visitors found the exhibit frightening – which is not surprising given the nature of the exhibit and well as the inherent fear that most people have of snakes.

In a series of retrospective questions, visitors indicated that their attitude towards snakes had changed by the end of their visit. Before visiting the exhibit, 62% felt that snakes were dangerous while after visiting the exhibit this had dropped to 49%. Visitors also learnt about the conservation status of snakes – with respect to habitat destruction and population status (Fig. 1). There was a slight increase in the percentage of visitors who think that snakes make good pets (25% to 29%). This is not a good impression and indicates that this is a message which needs to be addressed in the exhibit. Therefore, despite the positive results of the survey, visitors do not always see exhibits the way keepers and educators do, hence the confusing messages about reptiles as pets. This is why studies of this nature are essential to ensure that the messages being conveyed by the exhibit are being interpreted by the visitors in the way they were intended to be understood.

Reason for Attendance

Fun and educational	6.00
It is something to do at uShaka	5.75
We saw it advertised	5.00
I love reptiles	4.00
Fun for the children	3.86
I am interested in a reptile as a pet	2.93

Self-reported motivation to visit the Dangerous Creatures exhibit (Mean score out of 7)

Overall the results of this preliminary study indicate that the Dangerous Creatures exhibit is achieving its goals of helping people to move from a place of fear of reptiles towards a fascination with these amazing creatures and a better understanding of the role of reptiles and amphibians in the ecosystem. The entertainment value is high, but this does not appear to detract from learning. Comments from visitors indicate that the high entertainment value attracted them to the exhibit, but the opportunities for learning kept them in the exhibit for longer. In fact, many visitors would not enter the exhibit if it was seen as 'a boring place to learn'. Further comments from visitors suggest that the opportunity to touch a snake or an iguana was a catalyst to changing their opinion of reptiles from 'scary and slimy' to 'smooth and beautiful'. This supports the conclusions reached by Packer & Ballantyne (2004) about the synergistic effects of entertainment and education.

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Experiential learning- Outbound nature camps

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Aristotle once said, *“For the things we have to learn before we can do them, we learn by doing them”*.

Experiential learning focuses on the learning process for the individual. It is often used synonymously with the phrase experiential education, however, while experiential learning considers the individual learning process, experiential education should be considered a broader philosophy of education. An example of experiential learning is going to the zoo and learning through observation and interaction with the zoo environment, as opposed to reading about animals from a book. We decide to try and take this one step forward by taking people out to where the animals actually live, out in the wild. This led us to the creation of our program called “Tails to Trails”

The “Tails to Trails” concept was born in 2012 with the aim to generate greater understanding about nature, ecology and wildlife in their natural habitat. We wanted to provide a fun and memorable experience to people from all kind of walks and who are interested in forests, nature and wildlife. We believe that we now need to think outside the box when it comes to promoting the ideas of conservation. We have learnt that experiencing the outdoors and getting a feel for the animals in their natural spaces goes a long way in promoting the message of conservation to a much wider and diverse audience. They in-

turn become proponents of the conservation message and this we hope will lead to positive actions.

Tails to Trails is administered and operated by the ‘Madras Crocodile Bank Trust’ (Croc Bank). Croc Bank is a specialized reptile zoo in South India and is known as one of the first crocodile conservation-breeding centers in Asia. Founded in the 1970’s to conserve the three species of Indian crocodylians and to establish programs for conservation, education, outreach and propagation of endangered reptiles, the mission of the trust was and is “To promote the conservation of reptiles and amphibians and their habitats through education, scientific research and captive breeding.” Our efforts are focused on, but are not limited to, Indian species and ecosystems and include both in-situ and ex-situ components. Today Croc Bank is home to 18 species of crocodiles, 7 species of snakes, and 13 species of turtles. Croc bank is an open classroom and has team of experts who are widely travelled, experienced and deeply passionate, not only about herpetofauna but ecology and conservation in general. The program engages with these people and they in-turn share their knowledge and experience.

Our initial programs started small, were based at the Croc Bank and sometimes extended to one of our 3 field stations. They were focused on reptiles

and amphibians. But over the last few months we have expanded our program scope to include other taxa and general biodiversity in the various ecosystems in India.

For Tails to Trails we partner with conservation bodies, government and non government organizations, individual researchers and naturalists who are involved in environment education, wildlife research and conservation initiatives. We team with people, who favor wildlife and habitat protection and sustainable management, participate in efforts to improve effective and low impact tourism practices.

Each program duration is 4 to 7 days and is limited to 10 people. We have dealt with topics like forest ecology, species diversity, habitat diversity, animal behavior, animal interactions, animal and plant identification, animal tracking, using basic field equipments for research and methods of data collection and collation. and use. These programs also function as stepping stones for those who may be considering a career in wildlife sciences. It provides opportunities to participants to get an overview of the research station, interact with various wildlife biologists and researchers, experience first hand what a career in wildlife biology and management entails and then if interested even go on and volunteer with them.

Past camp locations include;

Madras Crocodile Bank Trust/ Centre for Herpetology- Chennai, Tamil Nadu

Agumbe Rainforest Research Station – Agumbe, Karnataka

Hypnale Research Station- Kuveshi, Karnataka

Swapnagandha Valley- Chorla Ghats, Goa,

Nature's Nest – adjoining Bhagawan Mahavir Wildlife Sanctuary, Goa

Karadi Malai Camp- Rom Whitaker and Janaki Lenin's farm near Chengalpattu, adjacent to a Tropical Dry Evergreen Forest

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Photographs:

above: Hypnale hypnale (Hump nosed pit viper)

opposite: Session on turtle taxonomy at Madras Crocodile Bank Trust (MCBT), Chennai, India

bottom left: Rachophorus malabaricus (Malabar Gliding Frog) at ARRS

below: Stream Crossing at Kuveshi on a Rainforest awareness camp

bottom: Stream ecology activity



The Role of Zoo Playgrounds: Beyond Playtime & into Conservation Awareness

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Graduate Student/Volunteer



Zoos provide conservation for animals and education opportunities for their communities. Children enjoy connecting with animals, but may not respond well to zoo exhibit signage (Charmayoff et al. 2001). Evidence suggests the installation of appropriate play spaces can bridge this gap and help foster a sense of environmental awareness in children (Adams and Kanter 2011; Worch and Haney 2011). The most effective way to educate children about the natural world is to merely let them explore outside (Parsons 2011). Natural playgrounds in a zoo setting provide children with the opportunity to exercise their bodies, and their minds, as well as encourage a life learning to love nature, which leads to environmentally concerned adults (Charmayoff et al. 2001; Sobel 2008).

Consider Woodland Park Zoo (WPZ) in Seattle, Washington. In an attempt to further their mission of providing “engaging experiences”, WPZ has several play areas for families to explore. These

spaces are found throughout the zoo and include two playgrounds: the Bamboo Forest Reserve (BFR), and the Habitat Discovery Loop (HDL). The BFR opened in May 2013, and is near the Asian small-clawed otter exhibit, and a tropical aviary. The HDL is an older feature, and is located near the Family Farm and Bug World, under cover of trees.

In the HDL, families find themselves transported to the size of small animals. The playground has features such as a giant orb spider web for climbing, mountain beaver tunnels, and child-size turtle shells. Here, children can engage in pretend play where they anthropomorphize animals, which creates a sense of caring for species that can last long into adulthood (Sobel 2008). Under the canopy of the forested play area, children challenge their bodies and stimulate their senses. They are encouraged to play at their own pace and make their own decisions; important elements to unstructured free play (Charmayoff et al.

2001; Worch and Haney 2011). This area is also home to urban wildlife: barred owls, song birds, and squirrels are frequent visitors. These wild creatures stimulate the innate sense of curiosity children hold about nature (Kola-Olusanya 2005; Miller et al. 2009). Children are encouraged to explore and discover: no space is off-limits, including the stream bed and the natural climbing tree, allowing for potential scientific discovery (Adams and Kanter 2011).

Free play outside can provide a release of energy and allow for emotional regulation (Starling 2011; Veitch et al. 2007). The BFR playground was designed with active play in mind. The playground was built to imitate natural bamboo poles, with climbing ropes attached along a wooden bridge, leading to a zip line. Children climb poles, and traverse ropes, utilizing a full range of movement and developing functional gross motor skills (Miller et al. 2009; Starling 2011). There are log benches and soft wood chips underfoot, which provides a welcoming atmosphere for families. After a visit to the BFR, visitors are refreshed and energized, ready to observe zoo animals (Erickson and Ernst 2011).

Zoo patrons often visit with the dual goals of exposing their children to learning opportunities and providing family recreation time (Yocco et al. 2010). The play spaces at WPZ incorporate features designed in line with research findings supporting free play as a means to achieving the zoo's mission, while also creating a venue for family recreation and fun. Offering unstructured play outdoors in settings such as the HDL and the BFR supports cognitive and early brain development, science learning in the form of problem solving and critical thinking skills, and provides a whole host of health benefits (Starling, 2011). Just being outdoors can inspire a conservation ethic (Street 2010), which can ultimately lead to becoming "defenders of nature" (Moore and Cosco 2000). In addition, merely being located near captive wildlife provides children with fodder for imaginative play, and gives them the tools to build empathy for nature in a meaningful way (Miller et al. 2009). The evidence in favor of play spaces as complements to traditional zoo exhibits continues to grow. As zoos expand and renovate their infrastructure, Woodland Park Zoo and others like it can serve as models for educational play space design.

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Acknowledgements

Woodland Park Zoo; Kathryn Owen, WPZ; Mary Jackson, WPZ; Jenny Mears, WPZ; Project Dragonfly instructors and peers; Jeff Crumb; Sara Crumb; Jennifer Kutz; Dawn Chesbro; Carrie Antal.

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Can Games Change Behaviour?

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Abstract

“Gamification” is the application of game-design thinking to non-game concepts to make them more fun and engaging. This methodology was introduced at Paignton Zoo to test whether it is a useful tool to engage, educate and change long term visitor behaviour.

Introduction

Modern zoos play a vital role in free choice learning and promote themselves as educational establishments (Packer and Ballantyne 2010). An individual's impact on wild spaces, both now and in the future needs to be addressed to protect natural habitats for populations to thrive. However, to cultivate sensitivity in people, encouraging them to adopt environmentally responsible practices in their everyday lives, proves to be one of the biggest obstacles for governments and conservation organisations, industry and business (Scott and Gough 2004). Although our society, through the media, is exposed to images of habitat destruction and climate change along with other environmental issues, there is a limited understanding of environmental problems (Jacobson, 1999). Gamification is a relatively new concept, but is starting to gain momentum in many industries. A recent report by Paula Owen (2013) supports this concept and the use of the “fun & games 4Es theory”, which includes: Entertain, Engage, Educate and Engender behavioural change. Working with this concept Paignton Zoo wanted to evaluate the use of this tool in its free choice learning environment.

Methodology

A range of classic games with an eco-twist were developed and delivered throughout the Zoo to engage and educate the Zoo's general visitors with the aim of changing their behaviour. The use of gamification was decided as the method of delivery to ensure people have a positive experience whilst being introduced to the topic of sustainable living; creating a link between lifestyle and the impact it can have on the environment. The activities provided included: ‘Play Your Eco Cards Right’ (Fig.1), ‘Sustainability Snakes and Ladders’ (Fig. 2), an interactive sustainability touch-table and talk (including the use of puppets) (Fig.3) with cards to hand out which summarised learning and suggested follow up actions (Fig. 4).

Engagement was recorded by monitoring the number of visitors taking part in the different activities between May 2013 and September 2013. Data was collected on adult visitors (post 16) only. This was due to the inability to collect personal information such as an email address from visitors under 16.



Figure 1. Play your cards right being carried out in our discovery centre with a visitor.



Figure 2. An intern playing snakes and ladders with some of our visitors.



Figure 3. Two of our junior volunteers with play your cards right and our touch table for visitors to interact with.



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 Estimated cost to install	Estimated annual saving	Estimated time for it to pay for itself	Carbon dioxide saving per year	
Turning all appliances off standby	£0	£74	0	268kg
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Hot water tank jacket	£15	£40	Under 6 months	170kg
Primary pipe insulation	£10	£15	1 year	60kg
Fill gaps around skirting board	£20	£25	1 year	100kg
Floor insulation - timber floor	£770 or £100 (DIY)	£60	2 years	240kg
Loft insulation (100 - 270mm)	£50 - £350	£25	2 - 4 years	110kg

Figure 4. The credit card sized hand out included a summary of information and links to more information.

Questionnaires were given out on the day of delivery to measure knowledge, attitudes and commitment to behaviour change. A follow up study three months post visit was conducted via SurveyMonkey to measure whether visitors adopted rather than just pledged lifestyle changes. This method was selected as the most appropriate means of collecting data for this project as it is more economical in terms of time and money compared to interviews Cohen et al. (2007). To reduce emotive language and leading questions the questionnaires were adapted from a study by Paula Owen (2013) and then peer reviewed at the Zoo.

A collaboration with South West Water (SWW) was developed to encourage water saving as part of the project. As an incentive, free water saving devices donated by SWW were given to those willing to take part and fill out a questionnaire, to 'kick-start' sustainable living. These included a 'Leaky Loo' strip which can potentially save 400 litres of water per day, vouchers and details of a webpage (www.sww.savewater.co.uk/zoo) where SWW customers can request more free water saving devices.

Results

On the day:

The games were delivered over 86 days from May half term to the end of the summer holidays. A total of 7,153 (9.4%) adult visitors (post 16) were engaged with the activities at the Zoo out of a total 75,902 visiting the Zoo. Of these 7.2% (n=513) completed a questionnaire on the day about their experience.

When considering enjoyment and learning (Fig.5), the initial questionnaires show that 96.9% (n=497) enjoyed the activities they took part in and 97.5% (n=500) enjoyed the learning that took place. 88.5% (n=454) disagreed they didn't learn anything new from the games and 95.1% (n=488) agreed they learnt new actions that they could carry out at home. 96.5% (N=495) felt they could take action and 94.9% (n=487) either strongly agreed or agreed that they would be taking extra action after their visit to the Zoo (fig. 6).

Some of the verbal comments recorded when visitors were engaged in dialogue with volunteers running the activities included:

"I can't believe you can save that much from such simple things"

"I had no idea that mobile phones were linked to rainforests like that"

and

"I think it's brilliant to show people how they can make a difference"

These support the questionnaire data which indicates that learning took place.

Results Post Visit:

A follow up survey was sent via SurveyMonkey to each of the 513 visitors that completed a questionnaire on the day. With a 13.1% completion rate, responses came from ages ranging from 18-61+ years old. 69.2% (n=45) of the participants stated they had made lifestyle changes following their involvement with the Zoo activities with a further 10.8% (n=7) stating they hadn't yet but intended to. Looking at the changes these respondents claim to have made, the most common was switching things off standby and turning items off (70.1%, n=34). This on its own has potentially saved 61 tons of CO₂/year (calculated from data obtained through the Nidirect 2014 and Environmental Protection Agency 2014). Following this, recycling mobiles and being more aware of items they buy (both at 50%) were the next popular behaviour changes.

When asked the question 'If you haven't made any changes, can you please indicate why' 19.5% (n=8) responded with 'I am happy with the amount of environmental actions I take' and 'I am doing all I can possibly do', 17.1% (n=7) 'Still intend on making changes', 14.6% (n=6) stated 'I am restricted by cost' and 7.3% (n=3) answered 'I haven't learned anything that I wasn't already aware of'. Lastly, 87.7% (n=57) of the participants felt they were inspired by their visit to the Zoo.

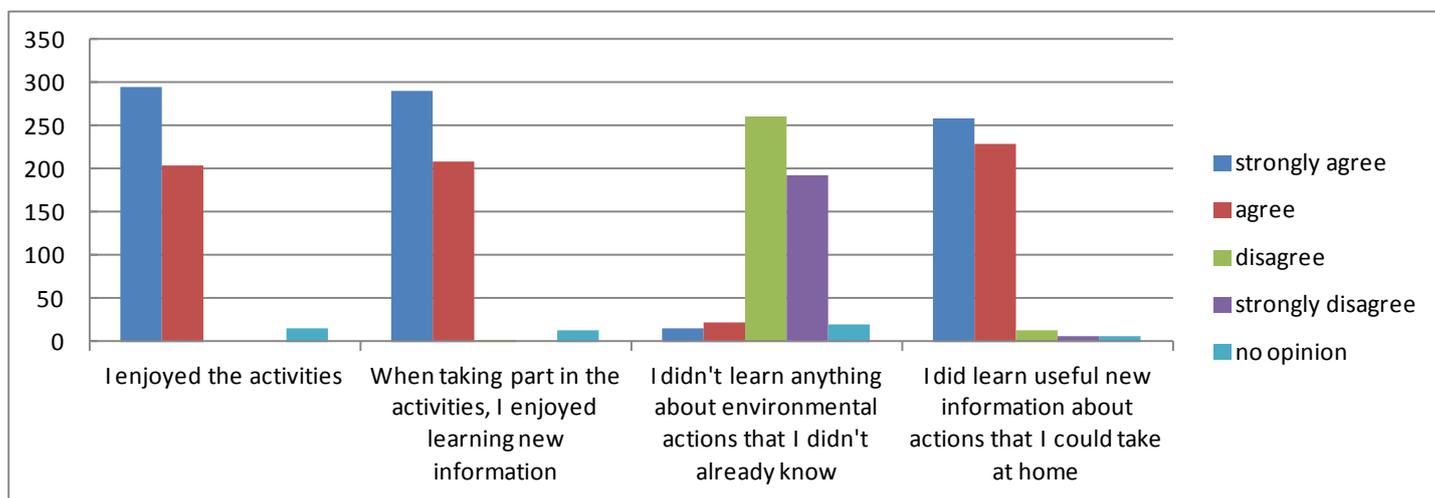


Figure 5. Visitors opinions on whether they enjoyed the games and whether they had learnt something on the day (n=513).

The use of freebies

66% of participants used the free Leaky Loo strip (n=35). 7.7% (n=3) found that they had a leaking toilet and got it fixed, saving a potential 10,342 litres of water a day. 14 vouchers were also filled out on site to send to South West Water for free devices.

Discussion

The aim of this project was to assess the use of gamification as a tool to engage, and cause behaviour change in zoo visitors. Relevant conclusions can be drawn from the data collected during this project as long as an appreciation and understanding of its limitations are taken into consideration. The nature of the data collection method (questionnaires) resulted in a limited number of responses although the use of an incentive increased participation numbers. However, the results provide an indication of attitudes and behaviour change.

The majority of visitors engaged agree that they were inspired and would change behaviours after their visit. Results post visit were incredibly promising suggesting 69.2% of participants have since implemented pro-sustainable actions at home, as a result of their involvement. This includes both energy and water savings. However, this data was collected from self-reporting questionnaires and, therefore, there is no way to tell how truthful a respondent is being. People may interpret questions differently or not read a question fully. This might be the case for question 3 on the follow up questionnaire which asked which behaviours they have since adopted. Although possible, it is unlikely that that many people have installed insulation and completed all of the indicated actions in the three month gap between their visit and the questionnaire. Nevertheless, even if it has re-raised the issue with them it could act as a reminder to carry out these actions. Though questionnaires

are a good method for large scale data collection, it is recommended that follow up interviews are also carried out with participants to increase validity of the results. This has not yet been done for this study.

The use of a freebie to boost behaviour change at the time did seem to encourage people to fill out the questionnaires. Future means of increasing the number of participants could include targeting one behaviour and completing the intervention activities where the desired behaviour is carried out (e.g. in shops to encourage the buying FSC products).

A really successful aspect of this project was the participation of the Zoo's junior volunteers and education interns in delivery. All individuals that took part in this project said that it pushed them out of their comfort zone has developed their knowledge and improved their confidence.

Comments on the initial feedback forms from the public included:

"Poppy was very interesting and great to listen to. She was very good."

Kelly (May 2013)

"The people we spoke to were very knowledgeable and enthusiastic, good to see young people leading the way!"

George (August 2013)

These comments indicate that involving young people as advocates portrayed positive messages to our visitors whilst also engaging with the topic.

Although the public engagement figures are based around adult engagement, it is important to note that children also engaged in the activities and were usually the ones that encouraged their parents to participate. By completing these activities through game play it targets all ages and is enjoyed by all age groups.

This is evident when looking at comments on the follow up questionnaire, for example:

“My children and I enjoyed the chat with the girls and it made us think more about the effect on our environment and the other species we share our planet with. The enthusiasm with which the talk was delivered was refreshing. Thanks”

Conclusion

In summary, the use of game-design thinking holds a lot of potential for creating sustainable lifestyle changes. Research indicates that it has successfully engaged Zoo visitors and initiated pro-environmental behaviour changes in a large proportion, after their visit. Using familiar games helps to reinforce messages in an enjoyable way that holds the visitors attention and is something to pursue further.

Acknowledgements

This project would not have been possible without funding from ALCOA Howmett and support from South West Water, donating items for us to give to the Zoo visitors and funding some of the resources. I would also like to thank our junior volunteers and interns for their help with delivery, inspiring visitors with the games.

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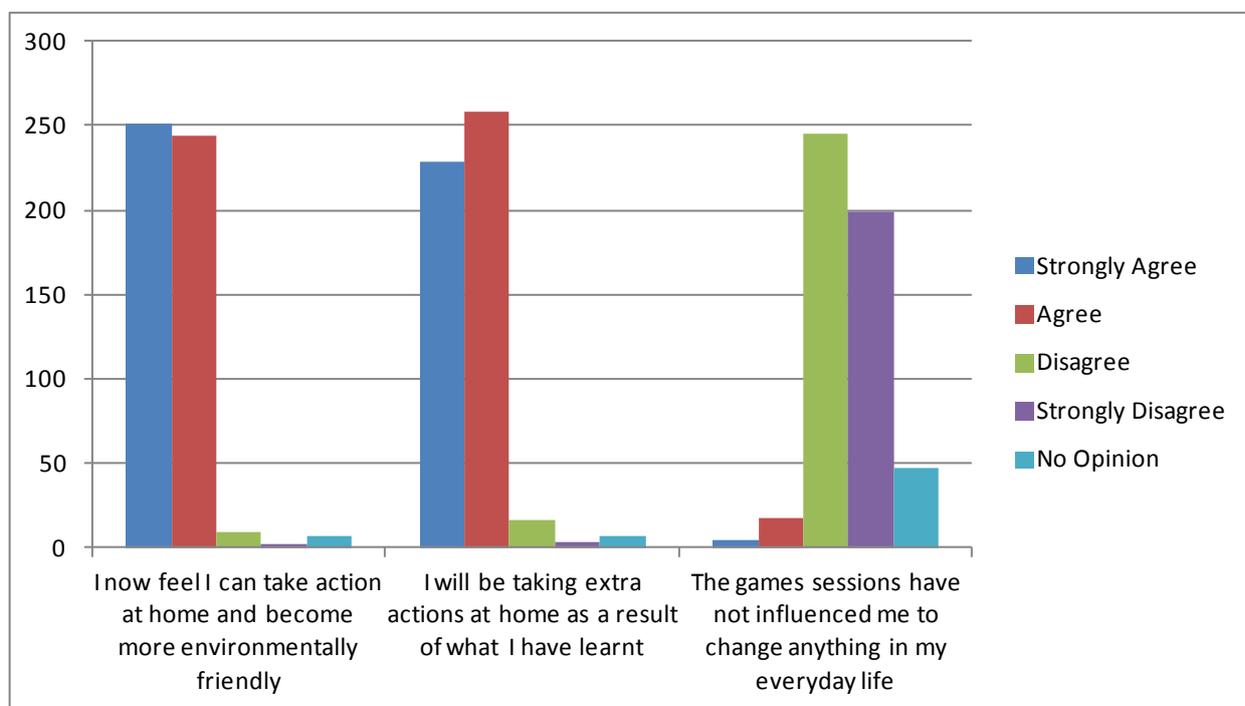


Figure 6. How many visitors feel they can now make a difference and will be making changes to their lifestyle because of the sustainable games (n=513).

How Can A Secret Forest Save Possums?

Emily Dunstan, Community Conservation Manager, Zoos Victoria, Australia

*Abstract: As part of its move to become a leading zoo-based conservation organisation, Zoos Victoria has committed to preventing the extinction of twenty local species. To achieve this agenda, the three Melbourne-based zoos recognise that engaging visitors to care and act in support of these species is vital. In an exhibit showcasing the Leadbeater's Possum (*Gymnobelideus leadbeateri*), zoo visitors were encouraged to consider the threats to the species such as deforestation and asked to choose Forest Stewardship Council (FSC) product options as a way to help. To test the effectiveness of the exhibit at influencing visitors' behaviour, an experience was set up where visitors were given a choice between choosing cheaper non-FSC and more expensive FSC postcards. Results showed that those visiting the exhibit were significantly more likely to choose the FSC option, suggesting that the exhibit was effective at influencing the short term behaviour of zoo visitors.*

Twenty species in need of help

If you asked a member of the public visiting an Australian zoo to name an endangered species, the majority of answers are likely to be iconic, international species facing extinction and in need of help. Yet Australia has the highest mammalian extinction rate in the world (Flannery, 2012) and some of the most unique fauna on the planet. As a result, Zoos Victoria (ZV) has strengthened its focus on the prevention of extinction of local endangered species.

As part of a Wildlife Conservation strategy, a review of local wildlife identified twenty species that, without intervention, were at risk of extinction within a decade. Zoos Victoria therefore made a commitment to ensure that these twenty locals do not go extinct. From previous campaign successes, once people are connected to an animal and see the link between simple choices and big changes, the numbers of those taking action for wildlife can increase dramatically. A key challenge for this initiative was that many of the twenty species were unknown, so before we could ask people to help save these animals, they needed to know and care about them and the issues they face.

Shining a light on Leadbeater's Possums

The flagship species within the group of twenty endangered species is Victoria's faunal emblem, the Leadbeater's Possum (*Gymnobelideus leadbeateri*), a small marsupial that relies on old tree hollows for survival (Harley et al., 2005). Healesville Sanctuary (one of three Zoos Victoria campuses) was tasked with the mission of helping visitors to connect with this species and understand the importance of protecting local forests. There were three key challenges to overcome:

- Leadbeater's Possums were unlikely to be seen by the public when visiting Healesville Sanctuary for at least a year;
- Children were the key target audience; and



- A suitable conservation action needed to be identified so visitors could help alleviate the threats to this species.

Engaging fun-seeking little animal lovers

Inspired by the wonder of popular children's stories such as Possum Magic and Harry Potter, the Healesville Sanctuary team created an interactive 'Secret Forest' to encourage children to venture into the world of the nocturnal possum led by a central character called 'Lunar Leadbeater'.

An old theatrette in the centre of the Sanctuary was transformed to house an immersive twilight forest setting and an interactive animation on a central screen. Through the animation, children were invited by Lunar to go on a 'magical torchlight adventure' – a 'stagwatch' – to find hidden Leadbeater's Possums in the Secret Forest. Children use 'torches' made from Wii-motes which interacted with the animated Lunar, as she guides them through the forest, discovering families of Leadbeater's Possums and finding out how possums need old trees and hollows to survive.

Lunar's Secret Forest - an immersive twilight forest setting and an interactive animation on a central screen



As described by ThinkOTS, the design team who put the experience together, the Secret Forest “takes advantage of digital interfaces that kids’ use every day to instantly engage the audience. A world first technology especially designed for a group experience using cutting edge interactive technology.”

Being able to interact with Lunar Leadbeater allowed visitors to engage with the ecology of the Leadbeater’s Possums and connect with the species without seeing one. Activity tables further highlighted other aspects of the possums’ behaviour and homes and provided children with the opportunity to publicly declare their love for Leadbeater’s Possums – by writing their promise to love possums on a recycled paper gum leaf and placing it on the forest branches, thereby symbolising their help to ‘regenerate’

Lunar’s Secret Forest. In the first months after the Secret Forest opened, more than 7,000 leaves with messages to Lunar were left on the trees.

Testing visitor behaviour onsite

Leadbeater’s Possums are threatened by the loss of habitat, and the combination of logging and catastrophic fire events has had huge impacts on the species survival (Lindenmayer, 2012). Using the Connect-Understand-Act delivery model*, it was identified that an effective way visitors could help reduce the threat of habitat loss was to purchase timber and paper products that were certified as being sustainably produced. As part of the onsite experience, visitors would be asked to look out for timber and paper products that carried the Forest Stewardship Council® logo on them. Forest Stewardship Council® (FSC®) is an internationally recognised, non-profit organisation that undertakes third-party certification for products and practises involved in forest management. The logo is easily recognisable on products, reducing the barriers for visitors to undertake this behaviour.

A short video was created to highlight the work that Healesville Sanctuary was doing to help save Leadbeater’s Possums and featured one of the key possum experts, Dr Dan Harley, asking visitors to look out for the FSC® logo. This was played regularly on two monitors at the back of Lunar’s Secret Forest, an area where adults were encouraged to sit down and rest whilst their children were engaged in the interactive screen.

In the previous Wipe for Wildlife campaign, behaviour change tools were used to encourage visitors to switch to 100% recycled toilet paper. Indeed, many of the behaviours ZV attempts to influence occur once



a visitor has left the site, so it is difficult to measure success. In campaigns like Wipe for Wildlife, ZV has previously relied on the use of public commitments or pledges as an intermediate measure and followed up periodically through post-visit surveying. For Lunar's Secret Forest and purchasing FSC®, a new approach for zoos was trialled: providing the purchase choice behaviour onsite in the retail stores.

Zoo gift shops helping conservation?

Two types of postcards with Leadbeater's Possum designs were offered for sale to Sanctuary visitors over four months. Identical designs were printed on both unlabelled 100% recycled card and labelled FSC® Recycled card. The FSC® Recycled postcards were priced at A\$1.50, whilst the unlabelled recycled postcards were A\$1.00. Both postcard types sat side-by-side in a retail stand at the gift store register. When visitors purchased these cards, retail staff asked the visitor if they had visited Lunar's Secret Forest during their visit and kept records of their responses along with numbers of sales. At the halfway point through the trial, postcards were swapped over in the retail stand to limit the effect of any right hand/left hand bias from visitors.

At the conclusion of the trial, 452 postcards had been sold with 59% of those sales coming from the higher priced FSC® labelled versions.

- Of the unlabelled postcards sold, 84% of visitors purchasing them had NOT visited Lunar's Secret Forest and 16% had.
- Of the FSC® labelled postcards sold, 52% had visited Lunar's Secret Forest and 48% had not.

Chi Square tests (with continuity correction) revealed a significant relationship between attending the Lunar's Secret Forest exhibit and purchasing an FSC® postcard ($\chi^2(1, 452) = 59.29, p = 0.00, \phi = 0.00$) as well as a relationship between left side FSC® postcards and purchase ($\chi^2(1, 452) = 7.91, p = 0.01, \phi = 0.14$). However, regression revealed that the effect of which side the FSC® postcard was placed

was non-significant when visiting the Lunar's Secret Forest exhibit was simultaneously considered as a predictor of purchasing behaviour. In other words, visiting Lunar's Secret Forest is a significant predictor of purchasing FSC® postcards, but the placement of the card is not (when factoring whether visitors attended the Lunar exhibit). Those who did not visit Lunar's Secret Forest appeared to be more likely to purchase the cheaper, unlabelled postcards.

As a note of caution, the model only explained 14% of the variance in why people purchased FSC® postcards, meaning there are many other factors which influence why people did or did not buy them which were not measured as part of this study. It is reasonable to accept that some of those visitors purchasing the labelled FSC® postcards may already be familiar with that trademark, and therefore visiting Lunar's Secret Forest may not make any difference, i.e. they would have purchased the FSC® labelled cards anyway.

As a zoo wanting to push the boundaries in behaviour change and assess its own success, this result indicated the value of the retail stores in creating a holistic conservation experience across the entire site.

As many of the visitors queried the price difference, retail staff had to be able to simply explain the difference between an FSC® product and one unlabelled. They were also able to provide more information and factsheets on sustainable forestry and FSC® upon visitor request. Zoos Victoria is continuing to integrate its community conservation campaigns and



wildlife conservation stories into the retail experience, so that all aspects of the zoo visit are working hard towards tangible conservation outcomes. This result showed that Sanctuary visitors were willing to pay more for an ethically labelled product and were more likely to do that as a result of the onsite visitor experiences – i.e. Lunar's Secret Forest.

Conclusion

This is one of the first occasions known of where a zoo has offered the visitor a choice in purchasing an endorsed product alongside an unmarked (and seemingly less endorsed) product. Many zoos who advocate for ethical purchasing only stock ethically produced items (i.e. "practise what they preach"). Whilst the unlabelled postcards were made from 100% recycled paper, visitors did not know this and instead saw a difference in visible certification and associated difference in price. This trial allowed the effectiveness of the onsite message to be assessed and also allowed the visitor to practise the desired behaviour before leaving. By practising the purchasing decision onsite, it is likely that they will be better placed to remember which product to choose once they are at the supermarket.

Using animation and technology, a child-based interactive experience was created, addressing the challenge of not having animals on display.

The 7000 plus 'possum promises' left behind to grow Lunar's forest indicates the high level of engagement visitors had with the Leadbeater's Possum. Whilst the chosen call-to-action (i.e. "Look for FSC") did not saturate the interactive experience, it did clearly highlight the utility of the CUA model* on encouraging behaviour change and the value of integrating the retail store into community conservation initiatives.

Testing the visitor behaviour whilst they are onsite is a brave move for many parks and zoos, as there is always the chance that an experience like this is not effective in changing behaviour and/or that visitors chastise the organisation for selling a seemingly 'bad' product. However, doing so enables us to test our methods, continually improve our behaviour change practises and better our chances for achieving real change in our communities – for both people and possums' sakes.

Connect – Understand – Act delivery model

Since 2005, Zoos Victoria has been trialling an education model that combines contemporary learning theories with behaviour change tools – establishing the Connect-Understand-Act conservation education model (Lowry, 2009). This model helps to engage visitors hearts (connect), minds (understand) and galvanise action (act) (Killeen, 2010).

Acknowledgements

The experience onsite at Healesville Sanctuary and the trial of postcard sales would not have been possible without the work of Andrea Burgess and Megan Wilson in visitors experience as well

as the entire Healesville Sanctuary retail team.

Melanie Matthews is the illustrator who brought Lunar Leadbeater into existence and ThinkOTS were the creative force who brought Lunar and her secret forest to life.

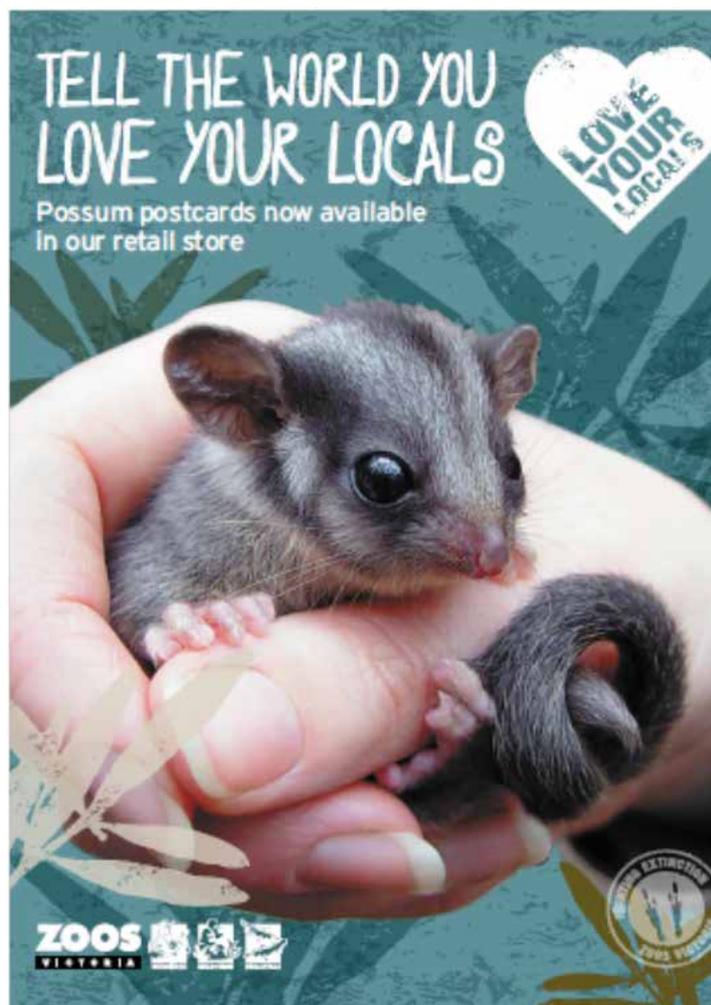
Thanks also go to Dr Liam Smith (BehaviourWorks, Monash University) for his advice on the postcard trial and assistance in compiling and analysing results.

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The Informal Learning Model: A Sociocultural Perspective of Questioning Pathways

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Abstract

The term “zoo” is a socially shared concept that is framed by society. In order to define how learning takes place in institutions of informal learning, such as zoos, we must identify the external stimuli within our society that influence informal learning. This paper focuses on the Interactions component of the Informal Learning Model from a sociocultural perspective and provides ideas about how zoo educators can use questioning to inform their teaching. During the study, visitors’ discourse was recorded to determine the level of questions that were occurring between visitors and between visitors and staff.

Introduction

The Informal Learning Model (Figure 1) illustrates that the informal learning experiences, which occur at the zoo, are molded by (1) the zoo’s definition of learning, (2) the images portrayed in the exhibits, (3) the interactions that occur between visitors and between visitors and staff, and (4) the information provided within the exhibit (Patrick & Tunnicliffe, 2012). Given that studies show that informal settings provide opportunities for science conversations (Zimmerman, Reeve, & Bell, 2010), more information is needed that focuses on the sociocultural interactions that occur during the visit. The social constructivist theory asserts that science learning occurs through socially mediated experiences such as conversations that transpire in social situations (Wood, Bruner, & Ross, 1976). Social experiences provide people with an opportunity to access prior knowledge about a subject and build on that knowledge to construct a new understanding (Bruning, Schraw, & Norby, 2011).

Much of the discourse that has been recorded in zoos examines how visitors learn within self-guided visits; however, less is known about the social discourse that occurs between the visitors and staff. Social discourse is viewed as a tool that is used in the process of learning and learning is evidenced in the change of the discourse patterns over time (Ash 2003). This study was specifically interested in the discourse that occurred between visitors and between visitors and staff in the form of questioning. Bloom’s Taxonomy (see Table 1) represents a way to classify learning objectives from recalling facts to a complex system of making judgments and validating ideas (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956).

Since its inception, Bloom’s Taxonomy has become a standard for the types of questions that elicit learning within each level of the learning objectives. Consequently, this study utilized Bloom’s Taxonomy to focus on the following research questions:

(1) What level in Bloom’s Taxonomy did the questions represent? (2) Did the level of questions change when visitors interacted with staff?

Methodology

This study took place in a gorilla exhibit at a large southeastern zoo. During a one day visit to the zoo, 115 conversations between visitors and between visitors and staff were recorded on paper and digitally. The staff included a zookeeper and two docents, who were located in two different areas of the exhibit; therefore, the same visitors may have been recorded

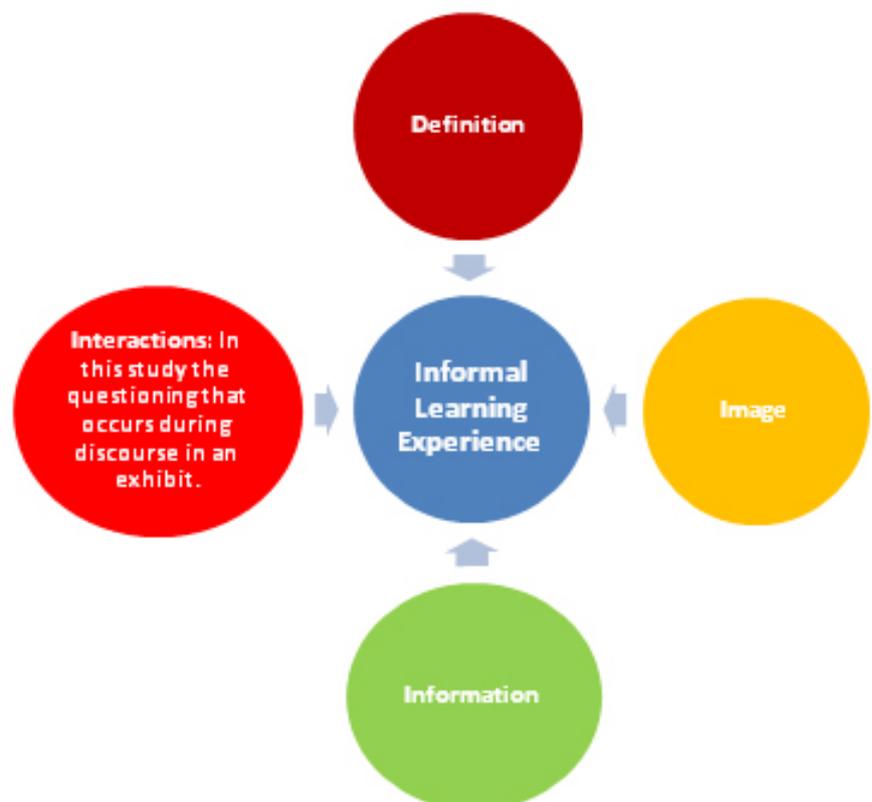


Figure 1. The Informal Learning Model shows the influence of questioning on an informal learning experience (Patrick & Tunnicliffe, 2012).

Figure 2. Bloom's Taxonomy Record Sheet.

Bloom's Level	Sample Questions	C1	C2	C3
		visitor to visitor	visitor to staff	staff to visitor
Knowledge Recalling facts, terms, basic concepts and answers.	What is...?, Where is...?, How old is...?, How many...? When do they...?, How long have...?, Who...?, Why are they doing...? When are we...? Where are we...? Did you see...? Can we...? Etc.			
Comprehension Organizing, comparing, translating, interpreting, giving descriptions and stating main ideas.	What can you tell me about...?, Can you tell me how...? Is...like...?, Why do they...?			
Application Applying acquired knowledge, facts, techniques and rules in a different way.	How do you think they use...?, Why do you think they use...?			
Analysis Identifying motives or causes; making inferences and finding evidence to support generalizations.	Can you think of another reason they need...?			
Synthesis Combining elements in a new pattern or proposing alternative solutions.	Why do you think they...?			
Evaluation Making judgments about information, validity of ideas or quality of work based on a set of criteria.	What do you think you can do to help...? Do you agree with...?			

on two separate occasions during the same visit. Two undergraduate science education students recorded the questions being asked by visitors and staff on a Bloom's Taxonomy Record Sheet (BTRS) (Figure 2) and with a digital recorder. The BTRS was developed from Writing Objectives Using Blooms Taxonomy (UNCCH, 2010).

The students were asked to make a mark on the record sheet each time they heard a question that correlated to a level on Bloom's Taxonomy and identify if the question was between visitors or between visitors and staff. For example, if the questions were asked within the group the student recorded only in the visitor/visitor column. If the visitor asked the same question of the staff the question was recorded again in the visitor/staff column. If a visitor asked their group the same question more than once, the question was only recorded once. A conversation was defined as the talk that occurred between the time the group entered and exited the area of the exhibit.

Data and Results

Table 1 illustrates the data from the analysis of the 115 conversations. Of the 2,391 questions that were asked, visitors asked 2,004 (84%) questions, with staff asking 387 (16%) questions.

Visitors Questions: Within their groups, visitors asked 1,442 (60%) questions. The visitors were found to engage mainly in Knowledge (1,304; 55%) related questions, which is Bloom's lowest level of questioning. The following are examples of the questions that occurred between visitors: "What is that?" "Where did it go?" "Do you see it?" "Where is it?" "Where are we?" "Where are we going next?" "Are we going

to eat?" "Where are we going to eat?" "Do you know what that is?" "Can they climb the trees?" "Do you think he looks like Uncle Bob (pseudonym)?" "Where is the bathroom?" "How old is ...?" "Did you see that?" Visitors did ask Comprehension (138, 6%) questions within their groups, but with less frequency. For example, they asked: "Why is (s)he doing that?" "Do you think our hands look like her/his hands?" "Why is (s)he picking his nose?" "Why did (s)he do that?" "Why is it hiding?" "Why is that one picking on that one?" However, visitors did not ask Application, Analysis, Synthesis, or Evaluation questions within their group. Visitors asked staff 562 (24%) questions. The discourse that took place between the visitors and the staff occurred after the visitors had asked questions within their groups. Of the 562 questions asked of staff, 77% (n=393) were initiated by visitors asking the same questions they had asked within their group. Visitors asked 313 (13%) Knowledge level questions such as: "Where is it?" "Where did it go?" "What is that?" "Where is the bathroom?" "What is her/his name?" "Which one is this one?" "Are they happy?" "What do they eat?" "Are we going to see the... next?" "When are we going to see the...?" However, visitors asked more Comprehension (244, 10%) level questions when interacting with the staff than they did within their groups. Visitors asked staff: "Why is (s) he doing that?" "Why do they eat grass?" "What do they do all day?" "Why is (s)he sitting like that?" "Do they see us like we see them?" "How are they related to us?" "What would you do if one escaped?" One visitor asked an Application level question ("If they are

so endangered, how can they be saved?") and one visitor asked a series of three Evaluation level questions ("I read in the paper that gorillas are endangered...there are only a few left in the world. Shouldn't these gorillas be in the wild...I mean how are gorillas sent back to the wild...you know...does the zoo help gorillas in the wild?").

Staff Questions:

The staff asked 387 (16%) questions and parallel to the visitor data the majority of staff questions were at the Knowledge level (223, 9%). Interestingly, the questions the staff asked visitors at the Knowledge level were comparable to the questions the staff was asked by the visitors. The staff asked visitors: "Do you see her/him?" "Do you see the male/female?" "Did you see her/him eating?" "Have you been to the other side?" "Did you see her/his hands?" "Did you see what (s)he did?" "Which one is that?" "What is (s)he doing now?" "Have you seen the...?" However, unlike the visitors' questions, the staff's questions ranged from the Knowledge level to the Evaluation level, but did not include questions from the Synthesis level. The following are examples of the types of questions the staff asked visitors.

Comprehension (125, 5%): "How are the gorilla's hands similar to your hands?"

Application (21, <1%): "If you were a gorilla, what would you like to eat?"

Analysis (11, <1%): "What are some of the problems you think gorillas face in the wild?"

Evaluation (7, <1%): "What do you think you can do to help the gorillas in the wild?"

When the staff instigated the questioning, they started with Knowledge level questions. If the discourse continued between the staff and the visitor, the staff asked higher order thinking questions, mostly at the Comprehension level.

Discussion

Although the study is of a small scale and is not meant to generalize broadly to all zoos, it provides insight into the questions that arise during social discourse in an exhibit. As a result of the analysis, the questions were found to take three paths: (1) visitor to visitor, (2) visitor to staff, and (3) staff to visitor. The questions that occur most often in all pathways are Knowledge level questions that relate to animal location, animal behavior and the visitor's group activities, such as, the location of specific facilities and the next organism the group will visit. However, the pathways show that the discourse that took place between the visitor and the staff encouraged the visitors to ask more Comprehension related questions; meaning that when visitors interact with the staff, they ask higher level questions. During the discourse, the staff took on two main roles: Sage and Facilitator. The staff acted as a Sage answering lower level questions that required short answers. However, once the staff was engaged in the conversation with the visitor, the staff's role reversed and they became

Bloom's Level	Questions Between Visitors n(%)	Staff Questions to Visitors n(%)	Visitor Questions to Staff n(%)
Knowledge	1,304 (55%)	223 (9%)	313 (13%)
Comprehension	138 (6%)	125 (5%)	245 (10%)
Application	0 (0%)	21 (<1%)	1 (<1%)
Analysis	0 (0%)	11 (<1%)	0 (0%)
Synthesis	0 (0%)	0	0 (0%)
Evaluation	0 (0%)	7 (<1%)	3 (<1%)
Total	1442 (61%)	387 (15%)	562 (24%)

Table 1. The Bloom's Level at which visitors' and staff's questions were scored. N=2,391 questions.

a Facilitator who asked visitors questions that began at a lower level and progressed to a higher level. Not only do the questioning pathways reinforce the use of sociocultural perspectives for understanding questioning in a zoo exhibit, but are suggestive of program designs that take into account the interactions that take place between the staff and the visitors.

Conclusion

This study indicates that if staff members are trained in questioning techniques, they may influence the level of learning discourse that takes place between the visitors and between the visitors and the staff. The majority of questions were initiated by the visitors, while the majority of higher order questions originated with the staff. This suggests that zoos need to rethink how their program facilitators can best support the questioning that occurs during the visit. The key conclusions drawn from this study for identifying the level of questions that occur between the visitors and between the visitors and staff are to determine the types of questions that could be put into practice within an exhibit. The sociocultural discourse that takes place is specific to an exhibit, so it is important to link or relate the questions to the exhibit and to the visitors' prior knowledge.

Using Bloom's Taxonomy as a quick analysis of the types, levels, and pathways of questions that are being asked within exhibits, educators may identify the information that staff ought to focus on with questioning that will stimulate visitor wonder, encourage conservation action, foster a positive attitude toward the natural world, incite engagement in questions about conservation practices, inspire the visitor to find more information when they leave the zoo, and cultivate new conceptualizations that promote diverse types of questions. The challenge for zoos is to have staff members that are not only knowledgeable of the organisms in the exhibit, but are also able to interact with visitors through higher order questioning. By answering the spontaneous questions asked by visitors and in turn asking higher order questions, the staff members may increase the holding power at the exhibit.

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IZE Journal 50 (2014)

Informing Leadership Practices: Exploring Relationships between Student Engagement in Science and Zoo Education Programs

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Introduction

School principals, especially in decentralized districts like the Greater Houston Area, wear many hats around campus. Much of today's current research has categorized their roles as an instructional leader, organizer of the school community, manager of interpersonal relationships within the school community, and resource/maintenance manager (Anderson 2008). With so much on their plate and so much at stake, principals, as a resource manager and a leader, need to know the student programs and experiences they support both inside and outside the classroom provide the best value possible to support students' overall success.

With the passing of the No Child Left Behind legislation, principals were forced to focus even more attention on their students' achievement. If you couple this widening gap with students' lack of motivation for sciences as they progress through school, principals are up against enormous odds.

To fill the achievement gap and renew motivation towards science studies, some researchers have proposed focusing on student engagement in schools and classrooms, especially for academically at-risk students, as an important factor to making a positive impact (Ladd and Dinella 2009; Dotterer and Lowe 2011). Epstein (2009) notes research supports the belief that less affluent students are certainly at a disadvantage because of the lack of exposure they have to community partners, such as zoos and museums, while growing up.

In an effort to help provide principals with decision-making information on educational programs at the Houston Zoo a study was conducted in the fall of 2012 to explore if there is a relationship between students' engagement in science in their classroom and students' participation in an educational program at the Houston Zoo.

Methods

Fifty-eight teachers that brought their students to participate in an educational class during a field experience at the Houston Zoo between September and December 2012 were administered an online survey by the researcher three weeks after having visited the Houston Zoo. The survey instrument used was a modified version of the preexisting Student Participation Questionnaire, and focused on questions pertaining to effort and initiative of students in the classroom, as well as a series of open-ended questions (Finn et al. 1995).

While the educational, science-based programs portion of this study was conducted at the Houston Zoo, the participants in the study were teachers from schools and districts in the Greater Houston Area. The programs at the Houston Zoo were 45-minute long, state standards-aligned, interactive presentations that include the use of animal artifacts (skins, skulls, etc.) and live animals.

Results

The number of respondents did not allow testing for statistical significance for the Likert scale questions. However, the rated effort scale items scored an average rating of 3.38 (See Table 1), which was below the average rating of the initiative taking scale items at an average of 3.62 (See Table 2) out of a score of 5.0.

In addition to the Likert scale questions, the participants were asked to respond to an open-ended question about engagement in science once back in the classroom. Seventeen (N = 17) teachers responded to the question, and the common themes that emerged were: excitement about science (answering questions more frequently, wanting to write about the Zoo upon returning to school, etc.), connectedness (connecting what was learned at the Zoo to the information studied in class), and science as a career option.

Two additional open-ended questions were posed to the educators in order to provide information for informing leadership practices. In reference to the extent the program impacted their students, three themes emerged: motivation, hands-on interactive activities with animals, and instructor excellence.

Table 1. Average Rating of Question by Respondents on the Effort Scale

Question	Average Rating (Scale 1-5)
Students' attention in science class has increased.	3.61
Students have increased the amount of homework they complete on time.	3.09
Students' persistence when confronted with difficult science-based problems has increased.	3.30
Students approach new science class assignments with increased effort.	3.57
Students have increased efforts to finish science class assignments even when they are difficult.	3.35

Table 2 Average Rating of Question by Respondents on the Initiative Taking Scale

Question	Average Rating (Scale 1-5)
Students have increased their attempts to do their science class work thoroughly and well, rather than just trying to get by.	3.52
Students' participation in class discussions about science has increased.	3.91
Students do more than just the assigned science class work.	3.30
Students' amount of questions about science information has increased.	3.73
Students have increased raising their hands to answer a science question or volunteer science information.	3.57
Students have increased engaging their teacher in conversation about science before or after school, or outside of class.	3.70

When asked about the extent to which the educators would recommend the program to other teachers, 18 (N = 18) teachers responded as recommending or highly recommending the program.

Discussion

The results from the open-ended questions will help to explore this observational relationship in student engagement in science as a result of the Houston Zoo education program. Axelson and Flick (2010) noted student engagement in the classroom could be associated with such characteristics as involvement and interest in the classroom instruction, and connections to the subject matter taught, which were common themes presented by the educators.

In theme one, excitement, approximately 45% of the teachers indicated the excitement in science the students exhibited upon returning from the field experience were tied to specific behaviors of increased connectedness to the subject matter through the desire to write about and do reports on animals, and the level of and quantity of questioning increasing. These behaviors, coupled with the teachers' observations, indicate the strength the education program had on the students' interest and involvement in the classroom.

The second most mentioned theme by the teachers was the increase students made in connecting classroom science to what they had learned while at the Houston Zoo. The teachers identified these connections to science through specifically mentioning the connections to material taught, as well as an increase in the detail added to class discussions and the expansion of knowledge through use of science-specific vocabulary.

In 2011, Crumpton and Gregory described an aspect of student engagement termed academic relevancy, a student's connection of the material learned in class to their real life experiences and how it is personally meaningful. In this study, academic relevancy was shown through the theme science as a career option. Educators commented that students identified working at a zoo or in science as an option as a result of attending the program.

Informing Leadership Practices

One of the intents of this study was to inform leadership practices related to zoo education programs and student engagement. When describing the impact the field experience had on their students, educators described a truly motivating experience. The teachers commented that the students came away wanting to pursue careers in science, asking more science related questions in class, and wanting to learn more when they got back to the classroom. All of these positive learning behaviors and interest in classroom instructional information are reflective of elements of both behavioral and emotional student engagement (Fredricks et al. 2004).

A second point the teachers described when referring to the impact the field experience had on their students was the focus on hands-on, interactive activities conducted during the Houston Zoo program. The teachers described seeing and touching animals they otherwise would not have the opportunity to see and/or touch brought the learning to life and helped students build personal connections to the material they were learning. The practice of utilizing live animals as part of the Houston Zoo educational programs is a purposeful experience, and the outcomes are in line with previous research.

Lastly, a point indicated by the teachers as a reason for them to extend a recommendation of the field experience to another educator, was the instructional excellence. The teachers commented specifically on their abilities of classroom management, engagement, and presentation skills. This is important for organizations to note the value the teachers placed on the instructional practice during the field experience.

Conclusion

Implications of this study impact both informal and formal educational leaders. One of the implications for informal science educational leaders is the professional preparation of their instructors. The teachers associated their view of the instructors with the value of the program and their recommendation to others to participate in the same program. Therefore, informal science educational leaders would behoove themselves to focus on the professional development of their staff, and more specifically the instructional strategies that best engage learners of all ages. The value teachers associate with good instruction in the classroom is not only important for the connection to the formal classroom environment, but also to continue to be able to effectively market programs to school leaders.

As informal education leaders we should continue to focus on facilitating collaboration with formal education leaders. As the results of this study showed, the class at the Houston Zoo was a motivational experience for the students, and their teachers reiterated this point through their comments on the impact it had on the students. Therefore, one could see how informal educators can step into a role where they view themselves as mainly as motivators; however, if value was placed on collaboration with the formal teachers, the extent to which student learning occurs could potentially increase (Patrick et al. 2011).

School leaders make choices. By whatever decision-making model they use, principals have to decide on how the dollars they are allocated would be best used for the students' learning and achievement in their schools (Epstein 2009).

As this study shows, zoo education programs are a way to generate a renewed interest in a topic, motivate the students to engage in science class through their work and questions, and expose students that

might not otherwise have an opportunity to visit a zoo to a novel environment in which they might learn about additional career options. Therefore, school leaders should support research-based, high value, low cost educational experiences with community partners that truly can complement and reinforce student learning.

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World War Zoo Gardens – wartime zoos, the challenging future and the use of zoo history in visitor engagement

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Abstract

The World War Zoo Gardens project at Newquay Zoo began in 2009 with the recreation of a 1940s wartime allotment garden for practical food production, enrichment and education activities, using multi-sensory museum education techniques, focussed on how zoos and botanic gardens survived wartime challenges worldwide. History, anniversaries, food and plants are used to engage and provoke visitors into discussion of sustainable future challenges by looking at solutions to past crises.



Introduction

Provoke, Relate, Reveal: Does the past hold the answer to the future?

“Why’s there an allotment in the middle of a zoo?” is the sort of puzzled question I love overhearing. If the author of Interpretive Master Planning and veteran American zoo interpretation guru John Veverka was listening, he’d be a happy man too. It demonstrates what Veverka says a good zoo talk, sign or enclosure should do: Provoke questions, Relate to the visitor, and Reveal answers or solutions (Veverka, 1994)

WWZG Photo 1: Recreated 1940s wartime Allotment Garden, Newquay Zoo.

Part of the ongoing role of our recreated 1940s wartime zoo keeper’s ‘victory garden’ at Newquay Zoo is to provoke discussion about future challenges such as How will we feed ourselves and our animals in the uncertain future?

Our allotment also has a familiar, everyday role that engages visitors, in that it relates to their family garden, home-grown food or memories of a grandparent’s allotment. Practically it also provides keepers with a small amount of fresh, organic unsprayed herbs,

flowers and vegetables for feeding and enrichment, although not quite on the scale of the long-established organic market garden at Jersey Zoo or Verti-Crop hydroponic experiment at Paignton Zoo (Frediani, 2010; Norris, 2014).

What answers or solutions are revealed through our wartime garden?

The future can sometimes appear quite dystopian and depressing. Zoos have a role in this uncertain future, both in how to survive a range of evolving global challenges and also the tricky task of how to engage their visitors with tackling these emerging threats (Mackenzie-Mohr, 2011). For zoo staff, there is a small amount of literature on the overlapping and challenging subject of crisis management in zoos (Greenwood, 2003; Walker, 2011).

“At the 10th Annual SAZARC Conference recently held in Nepal, the theme of Emergency Protocols was linked to 21st Century Crises of Climate Change, Emerging Diseases and Terrorism ... CZA also commissioned a Disaster Management Plan” (Walker, 2011, p. 19)

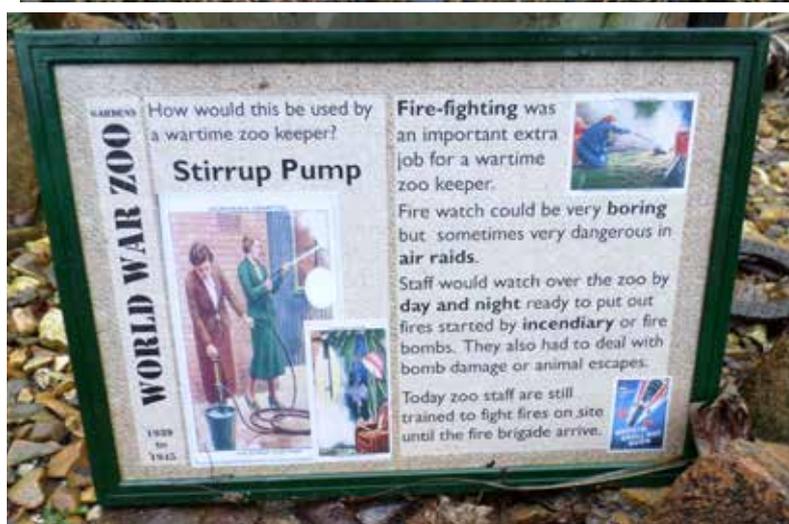
Zoo education often deals with directly animal-related challenges such as habitat loss. However there are also climate change, peak oil, resource shortages, food and fuel insecurity for zoos and their visitors to consider. This may require crisis management on a scale to match that of zoos preparing and improvising to survive wartime. Green MEP Carolyn Lucas in her New Home Front manifestos (Lucas, 2011; 2012) suggested that surviving the 21st century may need our economies and resources to be put onto a “war footing” to cope with environmental challenges (Lucas, 2011).

One problem is that our zoo visitors are visiting us usually for the traditional escapist ‘grand day out’ with the family - “a place of peaceful resort” as Dublin Zoo was called (De Courcy, 2009). Bill Conway of the Wildlife Conservation Society USA once talked of zoos as places where “recreation dollars can be turned into conservation dollars”. Rival visitor attractions such as theme parks for the education or visitor dollar don’t usually have this weighty mission statement. You don’t usually get challenged at a theme park to think about future electricity brown outs, except maybe whilst hanging upside down suspended in mid air during a rare and press-worthy power cut.

Materials and methods

How might we formally or informally engage zoo visitors with global future issues?

One approach we have informally tried is “chats over the garden fence” of our recreated wartime allotment, both formally to school groups or informally to visitors whilst weeding, sowing or harvesting. This is a family-friendly, inter-generational or cross-generational method because it is unexpected and also it:



- Relates to family experience, the return of schools gardening, family history or memories of rationing;
- Relates to thrift concerns and allotment booms during recent economic recessions;
- Reveals links to sustainability, food security, enrichment and other aspects of animal welfare.

In terms of informal learning we have a 'wartime zoo' visitor activity trail and trail sheet of A4 trail boards, of interest to general or family visitors as well an additional activity for formal learning or school visits after our history workshops.



Engaging non-traditional audiences through outreach

"What is the Zoo doing here?" is another 'provoke, relate, reveal' opportunity as we set up at a garden centre or history event. The wartime garden project has taken Newquay Zoo and its conservation and sustainability message out to wider audiences than normally or regularly visits a zoo.

- Talks and displays at garden centres, re-enactment events and garden societies;
- Talks and articles for zoo, garden and military 'social history' groups, as well as online genealogical forums and events;
- Online through our zoo website, social media and project blog <http://worldwarzoogardener1939.wordpress.com>;
- Links with national and local history commemoration events such as www.1914.org.

The project has created closer links for us with botanic gardens (some of which still have small animal collections), other zoos and our sister zoo Paignton Zoo, which was operational in wartime (Norris / BGEN, 2013). We have worked with Paignton staff in setting up history and wartime school workshops at both zoo sites.

Multi-sensory Museum Education in a Zoo?

A question to a teacher "What happened to animals in wartime?" prompted one recent

Photographs previous page

Visitor activity trail boards

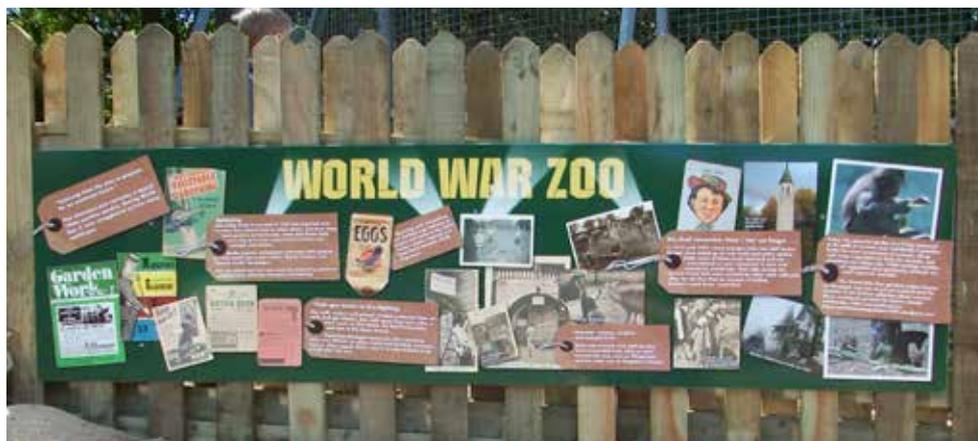
Zoo workshop handlable objects are usually Biofacts – skins, skulls, not usually shrapnel, steel helmets or stirrup pumps.

Section of a display cabinet and outreach display of wartime memorabilia.

Photographs this page:

From allotment plot to monkey paw in food minutes and food metres.

Permanent interpretation or graphics at Newquay Zoo beside our wartime allotment.



school class to visit Newquay Zoo for their wartime topic, rather than their usual local museum.

As well as elements of the practical food production in our recreated allotment garden that any botanic garden educator would use, our wartime workshops and display days for visitors feature many of the techniques that museum educators routinely use. Many may appear vaguely familiar to an experienced zoo educator.

In place of our usual zoo workshop resources of live animals and biofacts (skins, skulls, shells), we use a display table and handlable objects such as shrapnel from shells, steel helmets or stirrup pumps. Some of these are fragile original objects, others sturdy reproductions from history suppliers.

We approach the wartime zoo workshops in the same multi-sensory way as a normal zoo biology workshop but with slightly different resources and techniques:

- Sight: A resource bank of enlarged A3 photographs and original objects are used to introduce the role of animals and zoos in war zones in the past or today.
- Touch: weight and texture of original or reproduction objects such as helmets, gas masks, uniforms and shrapnel;
- Taste: we welcome groups with some wartime potato biscuits made by our cafe to an original recipe, ingredients carefully chosen to be free of modern food allergens such as dairy or nuts);
- Smell: the hardest to recreate but I'm not sure zoo animals have changed their smell much in war or peacetime. We also harvest fresh vegetables and aromatic herbs – Can the group identify the herbs by smell? - to scatter feed as enrichment for today's zoo animals;

- Sound: from atmospheric wartime music to teaching students the different (recorded or live) air raid sirens and whistles that some ingenious zoo animals learned to imitate, before finishing with students trying the noisily popular wooden gas warning rattle. This is all best done inside a classroom to avoid accidentally evacuating the zoo.

Other museum or heritage interpretation techniques include:

- Problem solving and scenarios such as “If you were a wartime or modern zoo keeper, what would you need to do to keep visitors safe and animals well fed?” or “Where is a safe place in our zoo for visitors to shelter during an air raid?”

- Role play, hot-seating and costumed interpreters or re-enactors (for example, I dress up as the zoo’s Air Raid Precautions instructor or a 1940s zoo keeper) to answer questions such as “How is his work changed in wartime, for example by food shortages?” Or her work, as women played an increasing role in wartime zoos, replacing young male staff called up to the armed services.

- Using real historical objects and eyewitness volunteers. One of our older zoo volunteers brings in his ration books and talks to the students or visitors about his wartime food and memories.

- Physical or role-play actions such as practising stirrup pump drill for fire-fighting (a zoo staff or even staff child job in wartime), thankfully with water but not real fire!

This last activity is tiring, wet and fun but as Confucius the Chinese philosopher said, “I hear and I forget. I see and I remember. I do and I understand.” Another activity with a real ‘take home’ message is where children make recycled paper pots and plant a wildlife-friendly sunflower or vegetable seed to take home. Forget digital, we like hands-on and dirty!

Being a zoological garden, we don’t forget the use of live animals and plants as teaching aids. We cheekily ‘enlist’ our children’s farm rabbits and free-range chickens through trail boards on the activity trail (not as pets but as a potential wartime source of back garden meat, eggs and fur). We also co-opt penguins (tricky to feed in wartime on scarce fish or substitute horse meat dipped in cod-liver oil) and large carnivores (How could they be fed or what would happen if they escaped in wartime?) as points on a zoo tour.

Even if you are not associated with a botanic garden, many interesting plants around a zoo can be conscripted into an activity trail or tour ranging from herbs and sunflowers to edible plants and flowers (Norris, 2014).

Unusual source materials and object questions

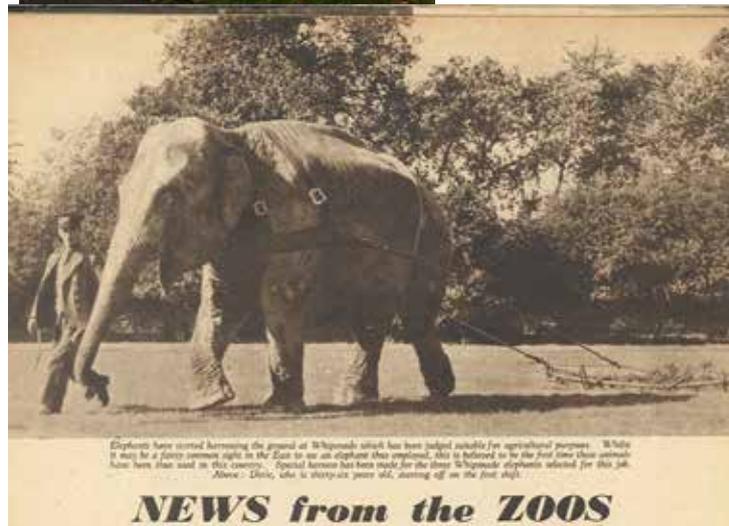
Heritage displays and historic objects, if well used, should help in generating questions: What was this object? What was it for? Who might have owned or used it? How does it link to animals and staff in

Percy Murray Adams, ZSL Whipsnade keeper, died on active service as a Japanese POW, 1943.

ZSL London Zoo war memorial to its staff lost on active service in both world wars (Photo by Kate Oliver/ ZSL).



Whipsnade Zoo elephants ploughing for victory (published Animal and Zoo Magazine, 1940).



wartime zoos? Is it still used today?

Original pet air raid ID tags or tales of medal winning-heroic animals on secret missions such as carrier pigeons (housed at Paignton Zoo) provide a gripping opening to this narrative or research journey.

Photographs or images ranging from posters to newspaper articles, drawings and adverts are used to illustrate part of researching a zoo’s history in wartime. Using examples from around the world connects with an increasingly multi-cultural audience. This also clearly engages with the useful classroom enquiry skills of historical research, learning how history is written and debated, misused or biased. This is something increasingly reflected in the history skills areas of the UK national school curriculum (UK Government, 2013).



Bombed Berlin Zoo Elephant House, 1943/44.



Wartime toys made from recycled materials. Toys were increasingly scarce and zoo gift shops increasingly empty of postcards, camera film and souvenirs. We have several lovely original examples of wartime scrap toys including a handmade Noah's Ark on display. Similar to fair-trade or developing world toys made from recycled materials, they prove a good link to design technology projects.

Different aspects of the wartime zoo experience worldwide can be covered through exploring interesting source images:

- an original magazine photograph of the Whipsnade Zoo elephant ploughing zoo paddocks for crops as part of "Dig For Victory";
- a poster for the Utility Exhibition "Off the Ration" model allotments at London Zoo;
- a photograph of the bombed Berlin Zoo elephant house;
- a leaflet about wartime recycling or toys handmade from scrap;
- a painting of a bombed oil tanker ablaze on our local coast
- "Use spades not ships" / "Let your shopping save our shipping" type adverts in a garden magazine about saving or growing food.

Some of these are included in the photographs, all can be supplied as images with captions rather than bullet points if desirable.

Older groups can be introduced to the possible propaganda message behind the creation of many of these objects and any inspirations for today or future challenges (Lucas, 2012).

Online newsreel archives, photo libraries along with many zoo or aquarium archives, memoirs or local history societies have useful images, relevant to your collection, country or local area. Payment or acknowledgement must be made to copyright holders, but create another chance to twin or share good practice with different local or national partners.

Samples of these images or resources are being collected into a book, to complement a schools resource pack and set of useful web links for classroom work, developed to assist local

teachers to support classroom studies before or after a zoo visit.

Our wartime zoo workshop for schools ends on a brief solemn note. Without today's care in peacetime, many animals did not survive long in struggling wartime zoos. Neither did many zoo staff on active service, so we use pictures of staff casualties listed on the WW1 and WW2 war memorial at London Zoo to focus this point.

Results: Evaluation

Activity trail sheet completion can be monitored and evaluated. Blog hits (55,000 hits since 2009) and media coverage have been monitored and quantified. Teacher or pupil feedback sheets on our wartime zoo workshops have been overwhelmingly positive so far, even inspiring one school to start its own 'wartime' allotment.

The challenge remains in finding suitable qualitative evaluation methods of visitor attitudes, which are appropriate for this light touch, informal chatty approach 'over the garden fence' outdoors. This challenge - What impact does visiting a zoo and its conservation message have on people's behaviour and values? – is part of a wider evaluation strategy (2013) planned to measure the 'conservation advocacy' success of Newquay Zoo and its partners in the wider Whitley Wildlife Conservation Trust.

Conclusion: The problems of history

What purpose does history serve? Which stories do we select to tell about our zoo and which forget?

History can be highly political and highly selective in what is remembered or commemorated and what is forgotten. Occupation, euthanasia or atrocity, like extinction, are not things to celebrate, rather to commemorate and learn from, much as is now done with Holocaust memorial day worldwide.

War is variously disastrous, destructive and disruptive for zoos.

“Events that affect societies often also affect zoos ... economic crises stress zoos and sometimes destroy them. The worst crisis society can experience is war” [Kisling, 2001, p.106]

The lesson of ‘never again’ has sadly proved somewhat optimistic with recent wartime problems at Baghdad, Sarajevo, Kabul, Tripoli and Ivory Coast zoos. However anniversaries and birthdays can be harnessed for positive effect.

A positive response is to look at the resourceful and ingenious approaches to crisis management by the zoo staff and local community. These range from ingenious substitute food supplies, to rebuilding the local zoo amongst post-war austerity in Budapest or Chester (where wartime surplus concrete tanktraps were used as building materials).

Our reunited and growing international zoo associations are also something to celebrate after a century of zoo networks forced apart by world war and Cold war politics (Penn, 2012).

It would be easy to slip into a narrow nationalist narrative of how Britain, its Empire and Allies ‘won’ the war. However the suffering of zoos and their keepers worldwide has a common humanitarian theme. Mazumi Itoh concludes in her harrowing book Japanese Wartime Zoo Policy that “zoo is peace...” or as Catherine de Courcy says of Dublin Zoo remaining politically neutral throughout civil war, it was a ‘place of peaceful resort’ (Itoh, 2010; De Courcy, 2009).

Our garden carries a simple inclusive memorial inscription:

In proud and loving memory of zoo and botanic garden staff and animals of all nations who have served and suffered in war since 1914.

May they never be forgotten as together we face the challenges of the future.

Acknowledgements

I would be interested to hear of any further wartime history links or use of history projects in zoos and botanic gardens. I would like to thank fellow members of The Bartlett Society for Zoo History research (www.zoohistory.co.uk), colleagues at Paignton and Newquay Zoo, the BGEN Botanic Gardens Education Network and BIAZA zoos, and archive staff at ZSL London Zoo and Kew Gardens for help with the project.

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*Schools workshop with author as ARP instructor and zoo volunteer ‘Home Guard’.
Credit: Lorraine Reid/ Newquay Zoo.*

The impact of animal presentations and personal interpretation leading to the development and application of Active Messaging Unit at Ocean Park Hong Kong

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Abstract

It is important to evaluate guests' educational experiences in zoos and aquariums. This paper utilizes surveys conducted before and after guests' visits at six facilities and an exit survey at Ocean Park to examine the impact of personal interpretation and animal presentations on guests. A new terminology, Active Messaging Unit, is introduced to quantify the average number of personal interpretation and presentations to which a guest is exposed to.



Introduction

There is no doubt that measuring the effectiveness of our educational messaging is one of the biggest trends in zoo and aquarium education. Conservation education is an important mandate for zoos and aquariums (Penning et al. 2009; WAZA 2005) and the industry must confirm that it is living up to its promise. What is even more important is for the industry to understand the effective ways in delivering messages so it could maximize the potentials of the experience. Ocean Park is a not-for-profit government chartered theme park in Hong Kong and has been accredited by Association of Zoos and Aquariums since 2002. The Park had started its first annual education

exit and attraction pre/ post survey in 2012/2013 to identify the overall and individual attractions' educational value. Through the survey, it was found that animal presentations were rated with the highest educational value. This paper will share key survey findings and how the Park set measurable goals to increase education's overall effectiveness.

Methods

An independent research company was employed to conduct the survey to prevent any potential bias. Six animal attractions at Ocean Park were chosen for this study including the Grand Aquarium, Rainforest, Giant Panda Adventure, South Pole Spectacular, Ocean Theatre and Bird Theatre.



The first four attractions listed are animal displays with interpretive elements and educators conducting narration; while the Ocean Theatre and Bird Theatre are show-type presentations with a conservation storyline in which the animals will demonstrate behaviours that could be seen in their wild counterparts.

While the first four attractions allow the guest to explore at their own pace, the two theatres are structured stories with a duration of 15 minutes. The survey interviews were conducted from November 15 to December 23, 2012.

The interviews were conducted at the entrance and exit of the animal attractions where the respondents were invited to have the pre-visit interview before entering the attractions; and post-visit interview when they left the attractions. To determine if the pre-survey influenced the post-survey outcome, a proportion of the respondents were only given a “simplified” post-only survey to reflect on their change in knowledge, attitude and commitment after viewing the exhibit.

Quota sampling was adopted in this survey. Target respondents were aged 10 or above where samples were evenly divided into three guest segments – local guests (Hong Kong locals), tourist visited as individual traveler and tourists who joined a tour group, which reflects the actual guest segments proportions for the Park. N=133/134 samples for each guest segment resulting in a total of N=400 samples for each animal attractions. In order for the results to be comparable among the six attractions, self-evaluation of knowledge towards conservation before and after the visit was asked using a 4-point scale.

There are certainly disadvantages in using this approach but it could allow a fair comparison among

the attractions. Guests were also asked about their attitude change and verbal commitment on behaviour change after visiting the attraction.

Other than conducting an annual survey focus on educational outcomes, the Park also conducts daily exit survey which covers a larger range of topics including guest demographic, purpose of visit and level of satisfaction. One of the questions which monitor the educational outcomes is “To what extent does the experience at Ocean Park enhanced your commitment to protect animal and environment?” The answers are measured on a 10-point scale. Score 0-6 indicate small or no impact. Scores from 7 to 10 indicate the experience have strong positive improvement on guests. The result of this daily exit survey will be used in the discussion section of this paper.

Results

The pre-survey was confirmed to have insignificant impact to the post-survey outcome when comparing the data obtained from the control group.

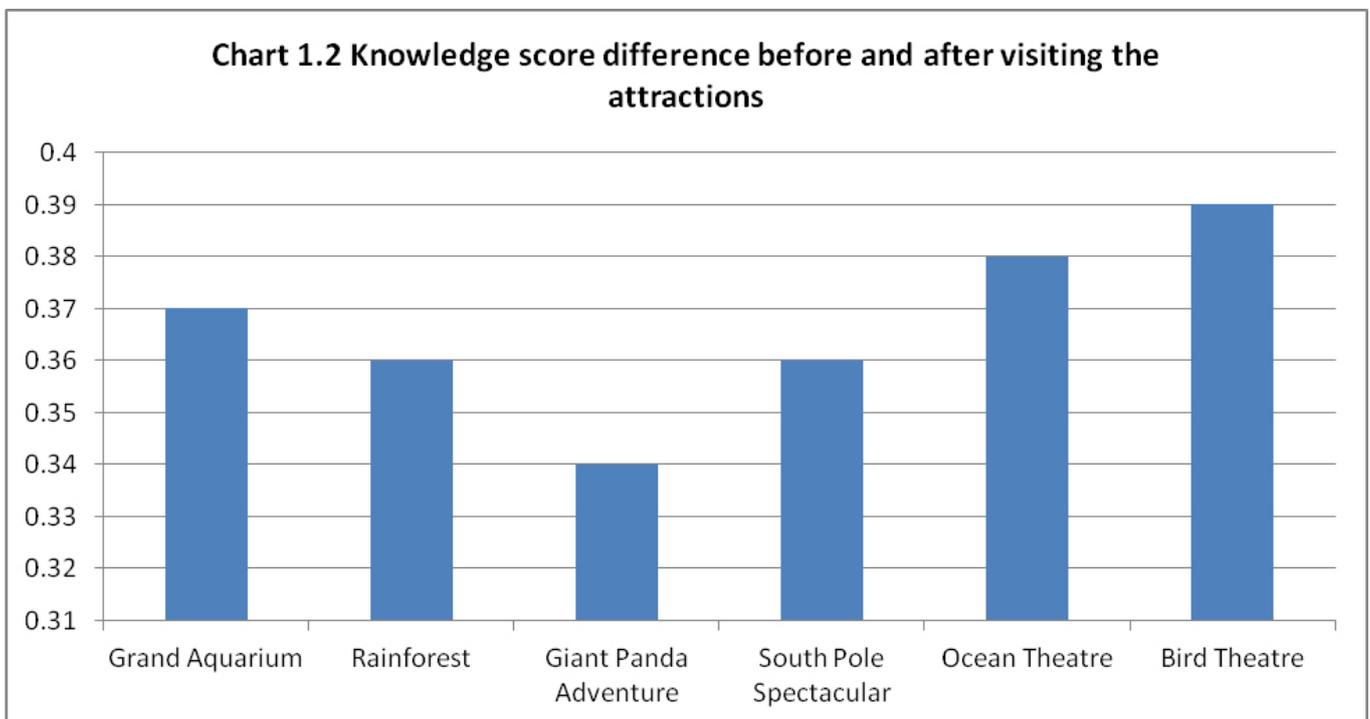
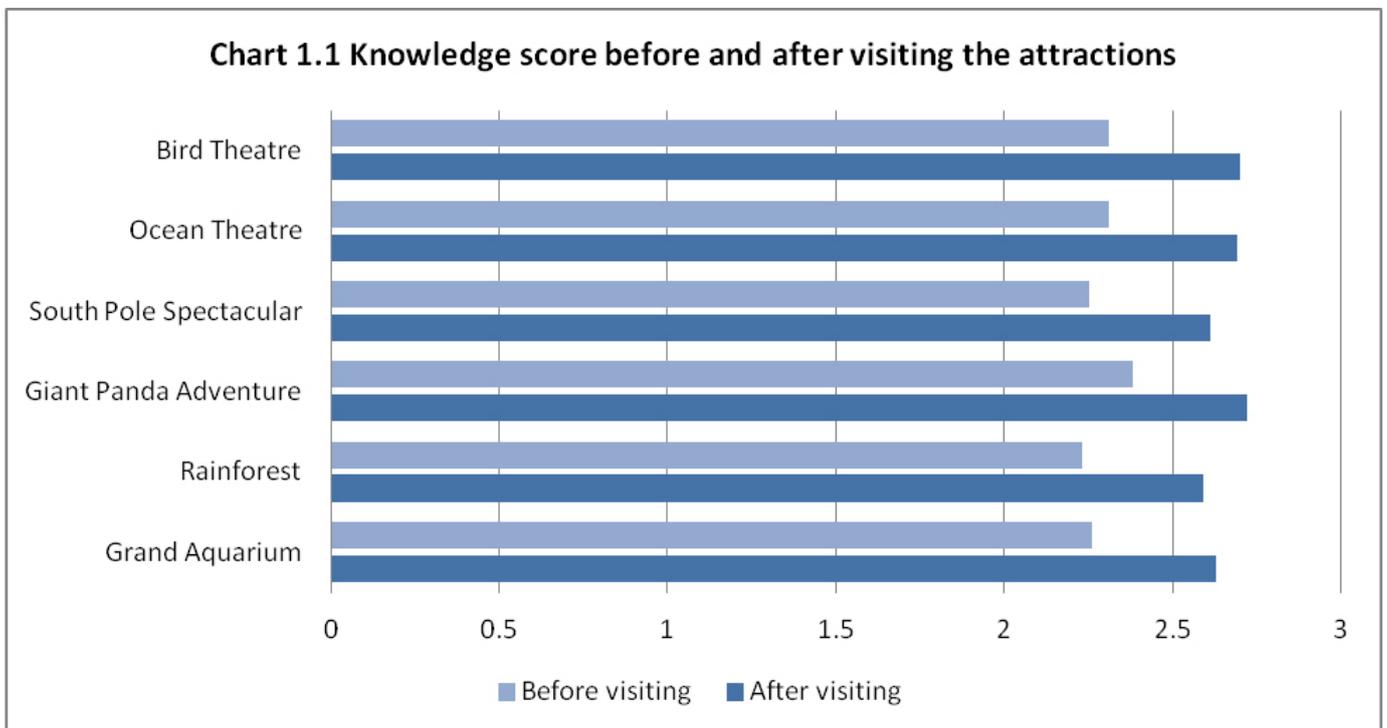
Knowledge change

After visiting the attractions, the respondents self reported that they are more knowledgeable as demonstrated by significant increase in the mean scores of all the six animal attractions.

While Giant Panda Adventure shows the highest self-reported score after the visit, the two theatre type of attractions (Ocean Theatre and Bird Theatre) showed the biggest increase in knowledge change.

Attitude change

On the question “My beliefs and attitude about animals and environment has been positively impacted” which was rated against a 10-point



scale, the mean score ranges from 7.19 to 7.96. The mean score for Rainforest was significantly lower than the other five while the mean score of Bird Theatre was highest, Ocean Theatre is the second, shortly followed by Grand Aquarium.

Verbal commitment

On the question “I am more committed to action that would support conservation” which was rated against a 10-point score, the mean score ranges from 7.32 to 8.09. The mean score for Rainforest was again significantly lower than the other five, while the mean score of Ocean Theatre was highest and Bird Theatre is the second.

This is a very brief survey largely rated in a self-reported manner. More studies will be needed to confirm the

actual knowledge and the behaviour change.

Discussion & Implications

The educational value of animal presentations

From the above results, it demonstrates that the animal presentations have the highest knowledge, positive attitude and verbal commitment impact on the guests. Although the other four animal exhibits do carry a storyline, they use a passive method of delivery and guests might not be able to pick up the storyline easily through a regular self-paced tour. The two presentations, on the contrary, are like a movie setting where you have a captive audience for the 15 minutes to introduce the story and talk about the conservation messages.

Chart 2 Positive beliefs and attitude change towards animals and environment after visiting the attractions

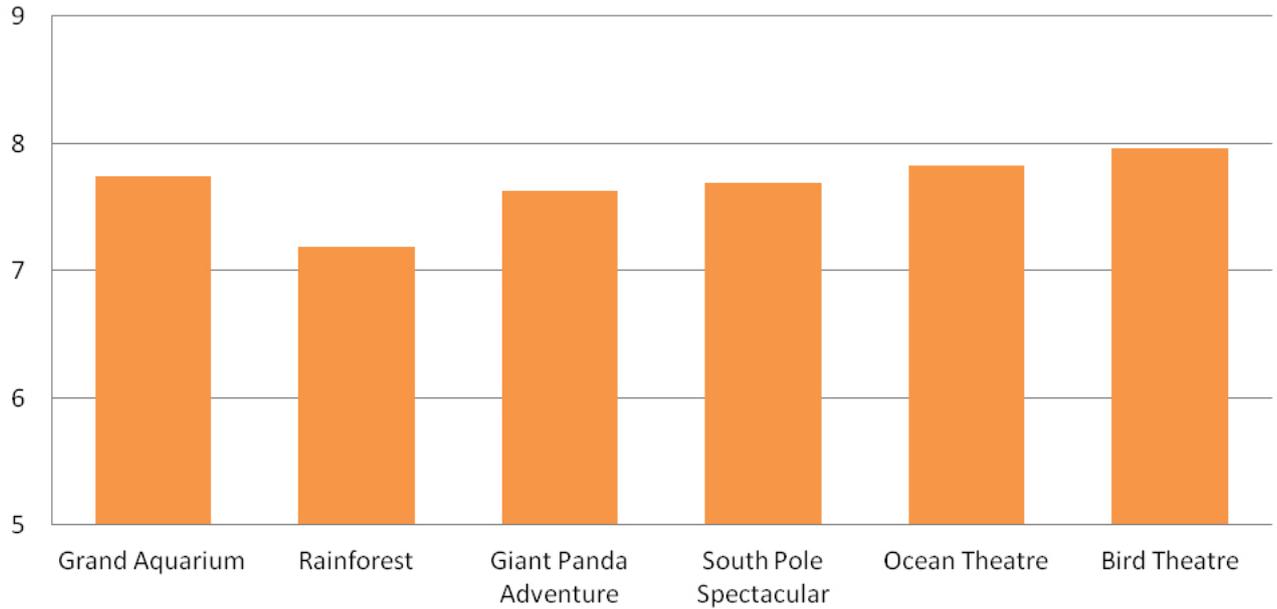


Chart 3 More committed to action that would support conservation

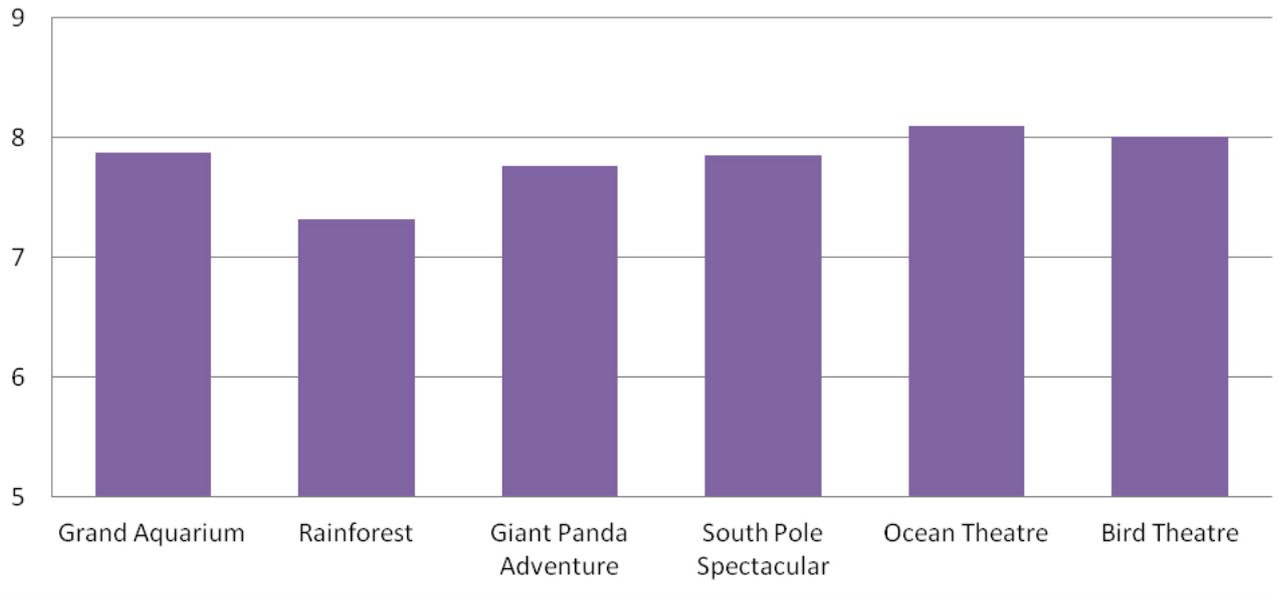
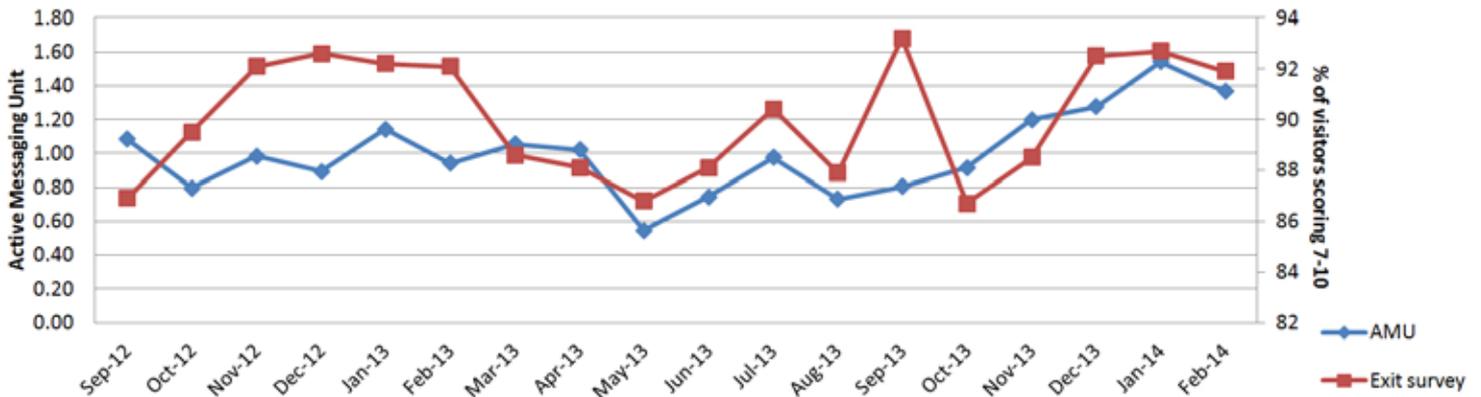


Chart 4 Relationship between Active Messaging Unit and percentage of guests' commitment to conserve



“Story” has been proven effective in education (McDrury & Alterio, 2002, Camiotti & Gray, 2012) and dolphin presentations have also been shown to be effective in United States (Miller et al, 2012). Guests’ actual behaviour change as result of Ocean Park’s dolphin presentation at the Ocean Theatre and bird presentation at Bird Theatre requires further studies, but this survey gives a strong indication that animal presentations have a larger impact over animal exhibits. With the increase in concern on moral and ethics for animal presentations, animal rights group have been requesting zoos and aquariums to ban presentations. It is worthwhile for zoos and aquariums to investigate the respectful way in conducting animal presentations. Ocean Park launched a new dolphin presentation in December 2013 to be more educational. Surveys will be conducted again to test the difference comparing to the previous presentation in the education and entertainment value. In this upcoming annual survey, the Park will also evaluate the exhibit “Secret Life of Seahorse”, which is a temporary exhibit adopted from Monterey Bay Aquarium with their kind support. Again, it would be interesting to see the results to see if such a nicely designed exhibit could give a higher educational value than animal presentations.

The education value of personal interpretation

Previous studies have shown that the more interpretation the guests experience during the visit, the higher is the education outcome (Weiler & Smith, 2009; Vernon et al., 2012). Monterey Bay Aquarium’s Multiphase Research Project – Inspiring Ocean Conservation (Vernon et al., 2012) has also revealed that staff members and volunteers serve important roles in communicating conservation messages. While the Ocean Park survey reflects guests’ positive outcomes in knowledge, pro-conservation attitude and verbal commitment after attending the six attractions, there appears to also be a positive correlation between the number of educators present onsite and the guest’s outcome. To measure the statistical validity of this relationship and explore the optimal numbers of educators, at exhibits with relatively lower education outcome, an index named Active Messaging Unit is created.

The application of Active Messaging Unit

Active Messaging Unit (AMU) is defined as:

(Number of audience for animal presentations + Number of guests the educators and trainers interacted through narration and programmes) / Overall Park attendance.

The Active Messaging Unit is compared against the daily exit survey results on asking the question “To what extent does the experience at Ocean Park enhance your commitment to protect animal and environment?” which is measured on a 10-point scale. Guests that score 7-10 are used to compare against the Active Messaging Unit for that month.

Pearson correlation for AMU and daily exit survey results is 0.44, which implies that there is a medium correlation between the two.

Since zoo and aquarium guest numbers differ every month, setting a target for AMU will help educators set measurable goals and arrange proper manpower (be it part-time or volunteers or full-time staff) each month. It is hoped that more zoos and aquariums could apply this concept and collectively the industry could measure if there is a certain “magical” AMU number which could cause a tipping point for pushing behaviour change.

Conclusion

Animal presentations and personal interpretation are shown to be effective in delivering conservation and influencing commitment to protect animals and the environment. With the use of Active Messaging Unit, it is hoped to set measurable goals for educators so that we could strategically manage the limited resources we have to achieve the highest impact.

Acknowledgements

- Mr. Tom Mehrmann and Ms. Suzanne Gendron for their leadership and support to education at Ocean Park;
- The team of 60 Ocean Park full-time educators who are passionate day-in and day-out in delivering education messages at the Park;
- Mr. Grant Abel, the curators and animal staff at the Park who work so closely with the education team to maximize our education impact;
- CSG researchers for providing their expertise to this survey.

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Defining and articulating the quality of learning in zoos

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Abstract

The Zoological Society of London's (ZSL) Discovery & Learning (D&L) team has recently gone through a process of defining the principles that shape their learning programme with consideration of how 'quality' is articulated to key audiences. A framework of five key Principles for Excellence were defined that the department felt underpinned learning at ZSL. These five Principles are the benchmark against which all learning activities and resources will be measured and new products shaped, in addition to prioritising evaluation needs.

How is the 'quality' of learning in zoos defined? How do zoos articulate what a zoo learning product 'is'? What makes zoos unique as learning environments? Over the last 12 months, the Discovery & Learning (D&L) Department at the Zoological Society of London (ZSL) have been considering these questions.

From April 2005, ZSL London Zoo benefitted from seven years of funding from the London Mayor's Office to grant state and independent schools free visits to ZSL London Zoo under the Free Visits Scheme. In 2012 this funding ceased. Bookings have since steadily increased, but the Zoo is not yet back to the highest figures of school visitation achieved in 2010 under the Free Visits Scheme period.

The termination of this funding was an ideal time to consider not only how to increase the quantity of school visits going forward, but for the Zoo's D&L Department to reflect upon what activity is offered schools. What made up a 'ZSL' schools activity or resource and how this was articulated to schools audiences? How can an organisation that stay competitive for out-of-classroom visits with sites such as the free National Museums and other attractions in London?

Internal stakeholder consultation

The first step was to consult with the teams within the D&L Department to clarify and categorise what they felt were the key elements of a ZSL schools activity or resource and how the programme should be promoted to key audiences.

A series of two hour consultations were undertaken with all staff in the D&L Department. This consultation specifically looked at the programme's online presence and considered what features were (or should be) main promotion points for the range of activities and events on offer.

Further consultation focused on the D&L Officer team and the process they went through to develop activities and events for delivery to schools audiences. The team considered the drivers for developing particular sessions, what elements and resources they included and why, and how they structured learning activities to best support students to reach intended learning outcomes.

This was a key reflective period for identifying the Department's perceived unique resources and best practice for learning at the Zoo, but it needed to be corroborated with teacher and student evaluation and feedback.

External stakeholder consultation

The next step was defining what teachers and students valued in an out-of-classroom visit to a zoo. What did they see as a zoo's unique selling points that enriched and extended classroom teaching and what were their reasons for visitation? There will likely always be a proportion who come for 'just a fun day out', but even so, how were teachers justifying zoo trips to school management?

In summer 2013, a consultation was undertaken with nineteen teachers, ranging in responsibilities from Early Years Foundation Stage (3-5 years old) to college level courses. Fourteen had visited ZSL London Zoo or ZSL Whipsnade Zoo with a school group previously, none had brought school groups on visits to both sites. The main findings identified teachers wanted sessions that used objects from the natural world as these resources not available in schools; they desired 'science in context' and access to scientific and keeper staff where possible and wanted pre- and post-visit support material that extended the work beyond the day of the visit.

In school visit evaluation forms, a number of features were identified as important to teachers. Strength of delivery staff presentation styles, interactive or 'hands on' nature of sessions, use of equipment and live animals, access to real objects from the natural world, Institute of Zoology scientific staff (only currently available in one bookable A-Level session), links to exhibits and clear links of session content to school class and coursework were regularly cited by teachers as the strengths of sessions delivered to schools.

However, these evaluation forms also identified that some sessions could have been strengthened by more use of objects and live animal handling collections, encourage a stronger use of scientific vocabulary relevant to the topic and alternative methods of delivery such as including more small group work and less 'talk up the front'.

Student feedback was recorded from formal observations of D&L Officers delivering schools sessions, including teacher comment where given. Student reaction and high levels of engagement when using objects and equipment in sessions, reaction to scientist talks and live animal handling collections provided some indication of the success of different resources. It is acknowledged that moving forward particular evaluation effort will need to be targeted on gaining insight to student experience and opinion.

As a result of the reflection and consultation, a framework of five Principles for Excellence were identified that the team felt reflected the best standard of what was a 'ZSL learning product'. The Principles were key to what the department felt underpinned, or should underpin, all D&L learning products at ZSL. These five Principles were the benchmark against which every existing product was to be measured and were to be used to shape new developments to help meet the Departments aspirations for excellence in zoo learning.

The framework of D&L's Principles for Excellence



2. Conservation in context - By exemplifying ZSL individuals and projects conservation is put in a real world context

ZSL is a leading organisation in the field of conservation research. It attracts exemplary researchers who are involved in conservation work in over 50 countries across the world. This provides 'conservation in context' – the most up-to-date examples of research being undertaken in the 'real world' and the personal journeys of the researchers, communities and also the species involved that can be used in learning activities and events.

3. Objects from the natural world - A learning experience is enriched by handling real objects that exemplify the content and cater to multiple learning styles

As important as visual stimuli are, it is not always possible or appropriate to access living collections in a more kinaesthetic manner. By using objects from the natural world, such as feathers, bones, shells and animal skins, in learning activities, students can gain a more well-rounded experience that caters to a number of learning styles. They also enable the application of practical skills such as weighing, measuring, close observation and direct comparison amongst others.



1. Living collections - Engagement with living collections raises motivation, inspiration and helps bring concepts to life.

The living collections are the primary attraction for visiting groups and help ZSL promote and achieve the worldwide conservation of animals and their habitats. The very 'living' nature of a zoo's collections is its most engaging attribute. Access to these collections is an incredibly memorable experience for any visitor, stimulating awe and wonder at the size, scale and sensory experience of being near live animals.



- Development and delivery approaches - A strong development framework and range of delivery approaches ensures we cater to all learner needs

The D&L programme for school groups aims to cater to a range of learning styles with strong visual, audio and kinaesthetic stimuli. Our activities encourage individual, small group and whole class work that includes storytelling, hands on workshops, lectures, practical learning programmes in the Zoo and more. School visitors are exposed to rich content presented in a variety of formats and have access to a range of resources to maximise the opportunity for an individual to reach any or all of myriad far-reaching outcomes during a visit.



4. Expertise and excellence... The people working for ZSL are one of its strongest assets and provide the personal stories that bring its work to life.

ZSL attracts leaders in their fields and hence has a wealth of expertise and experience that can be drawn on in the development of D&L activities. These individuals are a rich resource in themselves by providing not only their work in context, but their personal, engaging journeys and experiences that bring content to life. They provide role models that inspire and help raise the aspirations of school visitors who are building their own identity.

What happens next?

Once the framework of the Principles for Excellence was determined, an audit of the entire learning programme was undertaken at both ZSL sites, ZSL London Zoo and ZSL Whipsnade Zoo. Each education session and its associated onsite, pre- and post-visit resources were scrutinised and benchmarked against all five Principles. In a standardised 'audit sheet', detail was recorded of how each met, partially met or didn't meet each Principle.

Over five audit meetings with the Learning Manager and D&L Officers, the sessions that didn't meet or partially met certain Principles were prioritised for redevelopment work to ensure they met the newly defined quality standards. There are some sessions that can't realistically meet particular Principles, for example, using scientific staff in every session (Excellence and Expertise). In these instances, we aim to ensure the Principle

can be met to whatever degree was possible. In the example given we could add video content of scientists into session presentations or include web links to particular scientist's work in pre- or post-visit resources. The aspiration is that all five Principles for Excellence will be met to the highest degree possible through the session and its associated supporting resources.

As part of this process, it was acknowledged by all levels of management and the D&L Officer team that a standardised development process was desired that included audience and ZSL staff consultation from the earliest stages. In order to best meet internal drivers such strategic aims, to showcase real research, conservation in context and the personal stories of zoo staff and individual animals, there needed to be clear communication channels in order to know information could and should be included.

The next stage is to put an extensive and ongoing evaluation and research framework in place. This will gather evidence to measure the extent to which the Principles for Excellence help learners achieve intended learning outcomes, help ZSL to promote the quality of its learning programme and increase visitation of school groups. It will also be used to inform development and delivery processes to ensure we are achieving the best practice possible.

The D&L team is already discussing the need for a sixth Principle of Excellence to include in our development work. This will address how to support schools audiences to foster behaviour change to help ZSL meet its vision of A world where animals are valued, and their conservation assured. Watch this space!

Acknowledgements

Thank you to the Discovery & Learning Department and our schools audience who were involved in this process and gave their invaluable feedback.

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Climate Change: Engaging Audiences, Prompting Action, Measuring Change

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Climate change is a pressing concern and a challenging topic to present to guests. San Diego Zoo Global set out to integrate the topic of climate change into its Polar Bear Plunge exhibit. A story-based narrative explained the effects of polar ice loss on polar bears. The experience concluded with a call to action for guests to reduce CO₂ emissions. Results of an exhibit evaluation indicated that exhibit visitors had significantly more recall of the exhibit's key messages, and expressed more frequent intents to engage in CO₂-reducing conservation measures, relative to those in a matched comparison group.

Climate change is among the most significant environmental challenges faced by the world today. Zoos, and zoo educators, are increasingly pressed to address this challenge since it is having a profound effect on weather patterns, habitats and the animals those habitats contain. As professional educators they are well equipped to convey key facts, and provide interpretation of the challenge in ways that resonate with guests. Exhibits, programs, and periodicals provide the means of presenting the topic to visitors and other constituencies. However, broaching the subject can prove challenging. Concerns that involve political, religious, and scientific sensitivities can impact the zoo educator's work.

This article presents the systematic design of an interpretive experience, featuring polar bears, which focused on the theme of climate change. Results of an exhibit evaluation are presented to illustrate the exhibit's impact.

Climate Change Background

Climate change has occurred on this planet multiple times during Earth's history. This has resulted both during climatic periods of high and low temperatures. In the past, natural factors alone drove changes in our climate, but with the advent of the Industrial Revolution in the 18th century, the composition of our atmosphere has changed due to human impact.

Some of the human activities believed to be driving this change include the burning of coal and oil, urbanization, and deforestation. These human actions have led to increases of greenhouse gases, which act to trap heat in our atmosphere and result in increases in Earth's temperature. Data collected by NOAA and NASA indicate that "Earth's average temperature has risen by 1.4°F over the past century, and is projected to rise another 2 to 11.5°F over the next hundred years" (United States EPA n.d.). Other changes seen during this period are differences in rainfall patterns, sea level, and ice cover.



Where do all of these greenhouse gases, primarily CO₂, come from? They result mainly from buildings, vehicles, and industry. In fact, buildings, not cars, create most of the CO₂ in the U.S. (Miller 2009). And the U.S. is responsible for one-fifth of the world's CO₂ emissions, or about six billion metric tons per year. What is surprising is that the amount of emissions in the U.S. is predicted to increase to seven billion metric tons by 2030, due to growth in the economy and population. Thus the U.S. population is one of the biggest contributors to CO₂ emissions.

With the estimated increases in CO₂ emissions in most areas of the world, all sectors should review their CO₂-generating habitats and develop a plan to reduce them. But whether dealing with a business or a family, changing behavioral patterns is very time consuming and difficult, and replacing high-emission equipment and appliances is most often cost prohibitive.

If behavioral change is going to happen, people must be given not only a reason to care about the subject but also guidance and the appropriate tools.

Interpreters at the San Diego Zoo envisioned the existing Polar Bear Plunge exhibit as the perfect means to provide Zoo visitors with both guidance and tools.

Engaging Visitors with Climate Change

With conservation as its core mission, San Diego Zoo Global set out to address the topic of climate change with visitors to its San Diego Zoo campus. The work focused on a complete redesign of the Zoo's popular Polar Bear Plunge exhibit.

Working with a US\$1.1 million gift from local philanthropist Conrad Prebys, the reimagined interpretive experience immersed visitors in a story about polar bears. Storytelling is a time-tested, research-proven approach to relaying information (Schank and Abelson 1995). The use of storytelling, anchored in concepts familiar to the visitor, further

facilitates the transfer of information (Keller 2010). Thus, the visitor's mind (cognitive load) can focus on the content-related messages, rather than the strategy being used to present those messages (Chandler and Sweller 1992).

Pairing the polar bear species with climate change was a deliberate decision. The interpretive designers believed that link, between animal and climate change, would be one that visitors would fully grasp. This also can support visitors making the connection between exhibit and conservation action in their daily lives (Mann 2012).

The exhibit's story now presents natural history information about the polar bear along side data-based facts about the loss of polar ice, and its impact on polar bear reproduction and survival which has led to the polar bear's threatened status. The story ends with a simple graph charting the increase in CO₂ levels over time, and actions anyone can take to reduce CO₂ levels locally.

Table 1: Exhibit Interpretive Element Descriptions

Element	Description
Storybooks	Visitors begin by reading a story about polar bears from three super-sized, six-page illustrated storybooks that reveal facts about the polar bears, tell the tale of how the bears can live at the San Diego Zoo, and show how researchers learn more about this top Arctic predator (Figure 1).
Measure-up	Refrigerators, polar bear statues, scale. Life-size statues allow visitors to stand next to a full-grown adult bear (Figure 2), cozy up to a one-year old cub, and marvel at a tiny newborn. A giant scale helps visitors see how many people it takes to match an adult male polar bear's 1,500 pounds. Visitors can open a refrigerator to compare the amount of food a polar bear eats to their own average food consumption (Figure 3).
Interpretive Cart	Stationed at a cart, visitors can interact with a knowledgeable interpreter and touch skulls and other artifacts.
Polar Bear Den	Female bears create snow dens in which to give birth and shelter their cubs. Visitors can crawl into a replica of a polar bear den and see just how snug it is. They can check out the seal breathing holes in the ice to see how polar bears hunt for food, waiting for a seal to pop up (Figure 4).
Experience Wall	At the Experience Walls, visitors have the opportunity to "meet" the polar bears, and their keepers. At various times, keepers will open the large glass panels and interact with the bears through only wire mesh.
Research Helicopter	Researchers rely on helicopters to find polar bears in the Arctic. Visitors can climb into a real helicopter and discover what researchers are looking for on their flights and how they keep track of bears they are studying.
It's Melting	Visitors approach two displays showing sculpted, three-dimensional maps of Hudson Bay, created from actual NASA satellite images taken in 1989 and 2007. They can review how the Arctic sea ice has changed in less than 20 years and touch the cold "ice packs" (Figure 5).
Carbon Graph	This large, three-dimensional graph illustrates the CO ₂ concentrations in the atmosphere during the last 300 years. The graph demonstrates how the levels have increased since the onset of the Industrial Revolution, the current level of CO ₂ in our atmosphere, and the projected continuing increase in levels if humans do not take action. Some of the largest contributing factors are the use of electricity and natural gas in homes. Visitors discover ideas here for simple things they can do right now in their own lives to make a difference (Figure 6).

(Table contents "Explore the Exhibit" n.d.).

Key Messages Frame Systematic Design and Evaluation

Three key messages, and 15 submessages, were defined as an initial step in the interpretive experience design process (shaded areas of Table 1 detail the three overarching key messages).

The submessages further defined pieces of information guests would receive under each of these three areas. Together, the messages supported the systematic design of the interpretive elements, and ensured a consistent focus throughout the experience. By defining the knowledge visitors would acquire through the interpretive experience, the key messages also provided the “blueprint” around which the interpretive elements were designed, and the outcomes the exhibit evaluation was designed to measure.

Polar Bear Plunge Today

Today’s exhibit presents the Zoo’s Polar Bears in a dynamic interpretive experience. Often, climate change is addressed in exhibits with significant amounts of text and complex displays as well as providing great detail on the science and politics of the issue. The approach presented here was just the opposite. A simple story, framed by polar bears, framed the information presentation. Text panels were purposefully kept simple and headlines conveyed key messages. Displays and interactive features were used to gain the visitor’s attention and relate the relationship between polar bears and climate change.

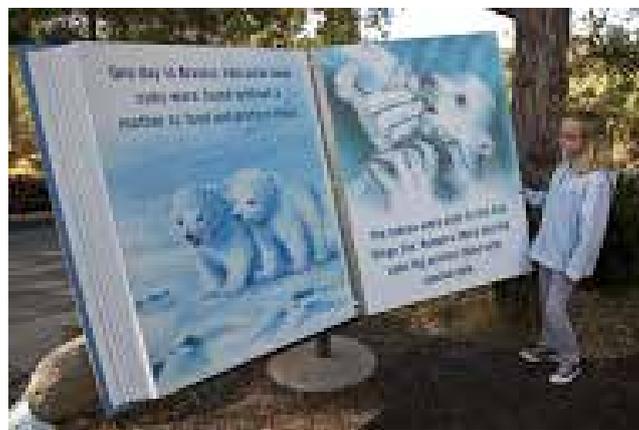
Materials and Methods

To better understand the impact of the reimagined interpretive experience, San Diego Zoo Global commissioned an exhibit evaluation. The study measured exhibit outcomes specific to the interpretive experience, visitor retention of key messages, and visitor intended action in response to conservation messages. Guided by the key messages that were established by the exhibit design team, the evaluator crafted an iPad-delivered survey instrument, and then collected data from 500 visitors.

The evaluation featured a quasi-experimental, single-measure design. An equal number of visitors were approached (a) prior to entering the Polar Bear Plunge exhibit – the “baseline” group (n=250), and (b) following their viewing of the exhibit – the Polar Bear Plunge (PBP) group (n=250). Among our reasons for collecting baseline data at the exhibit entrance was an attempt to control for visitor interest. All members of our final sample had interest in the exhibit, as evidenced by the fact they all intended to, or had, visited Polar Bear Plunge. Visitors were recruited with purpose to balance the two groups based on demographics of gender, age, and San Diego Zoo Global membership.

Results & Discussion

Almost 80% of the PBP group indicated they learned something new about polar bears as a result of their exhibit experience; 63% learned something new about climate change.



Interpretive Elements Viewed and Read

These learnings likely stem from the interpretive elements featured in the exhibit. On average, visitors viewed and read 3.14 of the seven interpretive elements, excluding the interpreter cart that is not always staffed. This average includes the over 47% of visitors who viewed and read four or more elements.

The polar bear statues and refrigerator with the polar bear diet inside proved to be the most impactful element, with 64.0% of visitors recalling these elements. However, the majority of visitors also indicated viewing and reading:

- Polar Bear Den (54.0%)
- It's Melting (55.2%)
- Carbon Graph (53.6%)

Of particular note, just under 7% of exhibit visitors indicated they had not viewed or read any of the exhibit elements. This occurrence was more prevalent in members (12.5% not viewing or reading), relative to non-members (6.6% not viewing or reading).

Visitor Recall and Intended Action

Analysis of visitor recall and intended action revealed statistically significant results. Visitor knowledge differed between those who had experienced the exhibit and those who had not, with Polar Bear Plunge visitors demonstrating more knowledge of key message-related content and ideas. Table 2 highlights findings between the baseline and Polar Bear Plunge (PBP) groups, for each of the three key messages.

Overall, a significant difference among age-defined groups existed only for one item that queried about the cause of climate change. This difference involved the 10-17-year-old group whose answers differed significantly when compared to both the 18-29 and 30-64 age-defined groups. Fifty percent (50.0%) of the 10-17 age group respondents (PBP group) answered this question correctly. This differs significantly when compared with the 18-29 age group (86.1% correct) and the 30-64 group (85.5% correct). Aside from this question, there were no significant differences in performance based on the visitor's age.

Conclusion

Results of the study favor, with statistically significant differences, the Polar Bear Plunge group's performance across each of the three targeted key messages. Findings within the Polar Bear Plunge group were constant, regardless of gender or San Diego Zoo Global membership. Further, the majority of visitors engaged with just under half of the exhibit's elements, and reported favorable overall ratings of their experiences. We conclude that the defined key messages, supported by the polar bear species, and related to guests through a compelling storyline and with eye-catching and thought-provoking interpretive elements, supported reliable acquisition of targeted knowledge.

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Table 2: Summary of Evaluation Findings

<p>Key Message 1: Polar bears live in the Arctic and rely on sea ice habitat for hunting and creating dens.</p>
<p>Relative to the Baseline Group's performance:</p> <ul style="list-style-type: none"> ▪ 11.0% more of the PBP group members were able to correctly identify the polar bear's primary food source—a statistically significant difference ($p \leq .01$) ▪ 2.8% more of the PBP group members were able to correctly identify the reason behind single births (versus the historical trend of twins)
<p>Key Message 2: The Earth's temperature has increased 1.2 to 1.4 degrees over the last 100 years, a result of climate change.</p>
<p>Relative to the Baseline Group's performance:</p> <ul style="list-style-type: none"> ▪ 25.6% more of the PBP group members were able to correctly identify CO₂ emissions as the cause of climate change—a statistically significant difference ($p = .000$) ▪ 8.8% more of the PBP group members were able to correctly state that the earth's temperature has increased over the last 100 years—a statistically significant difference ($p \leq .01$) ▪ 6.0% more of the PBP group members were able to correctly identify homes as the primary source of CO₂ emissions in the United States—a statistically significant difference ($p \leq .01$)
<p>Key Message 3: The San Diego Zoo empowers people to steward nature locally and globally.</p>
<p>Relative to the Baseline Group's performance:</p> <ul style="list-style-type: none"> ▪ 1.2% more of the PBP group members were able to correctly identify attributes of the San Diego Zoo Global and Polar Bears International partnership ▪ PBP group members were almost twice as likely to indicate they would begin buying local grown food as a conservation measure: 20.4% vs. 13.6% in the baseline group—a statistically significant difference ($p \leq .04$) ▪ PBP group members were more likely to indicate they would begin unplugging appliances when not in use as a conservation measure: 27.6% vs. 19.2% in the baseline group—a statistically significant difference ($p \leq .03$)

Climate Change - Get Involved



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**ZOOS &
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for 350**

Evolution of environmental education practices in Argentina; a multisensorial proposal

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Introduction

Everything started when, after 10 years of intense experience as head of the educational department at a local zoo in Argentina, we perceived (along with my wife) that it was time to redefine the term “environmental education”...And the most important shift we wanted was to think about it with the eyes of a kid... We were heading for an adventure of a lifetime and a radical change in our whole set of beliefs.

Materials and methods

We left our headquarters at Escobar and headed to Baradero, the most ancient town in the province of Bs. As. As soon as we got there, we met the leading voice of an institution with 106 years of pure history and legends. She narrated her story and immediately we were immersed in the German Asylum (Hogar Germán Frers). The place had the echoes of many generations of children, their laughs, their games and their adventures. It had been a dreamt place for childhood until changes in the Argentinean laws forced its shutting down. As time went by, the place started to lose its enchantment and was transformed into an almost abandoned place.

Seven years after that, the place started to work as a venue for volunteering programs, as an option to generate some income that could sustain its functioning, as it also provides food and support to 35 kids at risk-

Its facilities (rooms for 140 guests, playroom, dining area) are surrounded by 10 hectares (= 2.471 acres) and they include the orchard, a sports area, a centennial oak forest and a camping area. Together they provide unique opportunities to experience and discover nature.

We were instantly transported to our childhood, in every corner, tree or smell and consequently inspired. This was our kick off point to start defining with the eyes of a child. We started brainstorming different possibilities to explore the place, everything seemed climbable, sizeable, and touchable

Was this what had been introduced to us as “outdoor natural playgrounds” back in 2010 in the Programme Nature Start (held by the Chicago Zoological Society as a part of the International Early Childhood Training Program (CZS), Brookfield Chicago y and the Latin American Zoo and Aquarium Association)?

These were definitely the ingredients we were searching for to create our definition of environmental education... An activity that allowed each child to be transported into a unique multisensorial experience in profound contact with nature.

This was just the beginning of a retrospective analysis that led us to one of the oldest ways of learning, learning by playing. There was the key; “Play connected every

dot between education and nature –. We were really living the Chinese proverb that said that if we are told something, it will probably be forgotten; if we are shown something, it will probably be remembered but if we are involved in something, we will probably understand it.

We carried a small local research. We held meetings with different members of the area and started to put together facts, stories and anecdotes that were linked to tradition and culture. With great fascination we discovered the traces of prehispanic cultures, nations with a deep social and cultural identity, profoundly and respectfully associated (even in a religious way) to nature and each living organism.

Baradero is placed on the edge of a river, and we soon pictured those tribes’ life. We imagined every aspect of their days being part of this environment, of this river. The small tributaries where their routes, hollow trunks were they way of motion and gave them the possibility to reach to other spots in order to connect with other tribes. The whole ecosystem of this delta provided a balanced and varied diet which included meat from animals, large amounts of fish, vegetables and roots. They were fishermen and collectors and also cultivated beans, cabbage and corn.

These tribes were just THE example to show that a balanced use of the land allowed them to consume what they needed in a sustained equilibrium between men needs and nature.

History was to be a new ingredient in our definition. We also wanted to introduce the concept and relate it to the current human impact and the consequences that it has on our planet.

The landscape changed a lot since those tribal days. Agriculture and livestock farming have transformed the land.

Based in our experience at the Latin American Zoo and Aquarium Association, we witnessed several profound changes, that resulted in new objectives and methodologies. Nowadays we stand for a clear educational role facing alarming rates of ecosystem destruction and extinction.



Zoos are the second world's most visited places (after museums). They were initially places that invited to see collections of wild animals, now they have transformed into open spaces that have the unique opportunity of transmitting a message that seeks to generate a change in the relationship between men and the environment.

The question is now, how is the message going to be sent to assure that it is successfully received making an impact that helps us shift the actual alarming environmental situation? Are we aware that most of the information that the zoos provide can be found on the internet, on different documentaries, multimedia encyclopedias, etc. Are we really making an impact in the way the globalized society needs?

We believe we are facing a great opportunity to evolve once more. It's time To make the visit to the zoological gardens a complete experience that lasts for more than a day.

The magic we found in Baradero opened a door that needs to be analyzed. It's all about exploring, investigating, finding and experiencing nature.

YERRA –Education and Community, through HáBiTaT YERRA started to apply this view in:

- the design of playground areas,
- the adaptation of the environments for domestic animals,
- the conservation of a forest with native and exotic plants
- the implementation of educational material that aided the “explorers” in each habitat
- the transmission of ancient stories and its messages
- the careful selection of games and activities that stand for a play based education

In this way, we created the opportunity to learn by doing, celebration the great relationship that is consequently established between a broader definition of environment that not only includes plants and animals but also men considering the past the present and the future. It's also about understanding our history IN nature.

Going into the woods to discover new sounds, new adventures, new challenges that require to test our abilities and beliefs (Group work , self-esteem, trust, courage) definitely lead to be a part of nature instead of just a visitor.

Our Approach

With eyes blind-folded, we encourage children to elaborate a map that is sensory based. First they are asked to be silent and just guide themselves by following different sounds (birds, wind, creaking leaves and bushes); then sensory play is added through touching the bark of a centennial trunk, feeling its temperature in comparison to the temperature of the soil temperature; the sense of Smell is awakened by rubbing leaves. Once the activity is completed, it's time for the eyes to perceive the general picture. They soon feel empowered with this enriched view of the surrounding environment.

We also want to take with them a unique tool for survival, the ability to be calm and observe. Bird watching is the perfect activity. First they identify nesting areas, feeding spots and habits, guided by our educational material where they match what they see with the name of the bird and its description. They show great enthusiasm towards their findings and soon feel like experts.

As in every adventure. There are risks as well, so we also planned to introduce first aid maneuvers for outdoor explorers and problems solving techniques that can get us out of a risky situation using natural elements.

As the sun goes down, we build our own shelter, a multidiscipline task. Maths, strength, planning and sketching all at once, in a survival task.

Bird watching

If it is to survive, we must remain calm first and then learn to observe. Looking where the birds, in places that are fed, what they eat and where they nest, developed in this unique environment.

Once we abandon the woods, we open our way through the grasslands, a natural maze and see from a privileged view the impact of men and how the landscape was cleared for agricultural use. There, we also take some time to identify species of plants, that are lost once the land is used in agriculture.

There is also a planned visit to the orchard. Putting our hands to work, just as our ancient predecessors worked the land to produce their own food. They prepare the land, put fences and are introduced to



the different cycles and requirements of each specie.

A plus to this activity is in the tools they use. They are also made from reused materials (e.g.: the shovel is done with a plastic bottle).

Through the joint work with public organizations such as the Administration National Parks (APN), we were rewarded with a donation of 125 native trees. It was a great opportunity to get the kids involved. We prepared the land, we dig with our shovels, and soon a whole hectare became a forest with interactive paths awaiting for explorers.

Conclusion

This is the way HáBiTaT YERRA was conceived, and is evolving... as a Centre where nature can be experienced and visitors are explorers.

Image 6 In our logo we are represented by a native bird, – *Polyborus plancus* – as it plays a key role in the ecosystem and it is distributed almost all over the Argentinian territory.

More than 2500 kids aged between 8 and 12 have already been introduced to the experience of nature, being the perfect scenario for games, adventures, discoveries and ancient culture contact. They experienced nature and got their conclusions as regards human impact.

From YERRA this is the way we choose to transmit the message of conservation, a way where children have the opportunity to interact in an outdoor environment through multisensorial play, observation, comparison and experimentation. A way that leaves everlasting memories and a shift of attitude towards nature.

Our story represents the importance of including playfull experiences in nature in the design of educational programs in zoos and aquariums. Kids will treasure the experience as it was a unique opportunity to play freely in an outdoor environment.

The natural scenarios are definitely places of initiation, where we are placed as another part of the chain, as specie. The sense of being part of the same home, our planet is what needs to be cultivated.

This is the opportunity to promote a sense of empathy towards nature, that will surely translate into a feeling of belonging and an emerging need to protect it. It is the first step to generate the social change towards the conservation of biodiversity.

We invite you to just go back to your childhood memories, and analyze if you feel represented by our work.

Acknowledgements

Special thanks to Florencia Hempel for their contributions and collaboration in the translation of the document.

I thank my son, Mateo Stephan that allows me to see life through the eyes of a child.

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Can I touch it?: Zoo program impacts

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Abstract: As modern zoos strive to fulfill their conservation education missions, many seek to engage and inspire visitors by offering various contact experiences with animals. This study examined the impact physical contact with rats and snakes had on children's attitudes towards those animals. The results from short surveys with pictures and simple descriptive words showed that both seeing and touching an animal significantly improved feelings about that animal.



Introduction

As I gently pull the gopher snake from its carrier, some second-graders gasp, some smile, and others dramatically scoot away. We talk about the snake's diet and habitat needs and how they help control rodent populations. When it is time to touch the snake, the first student scowls and shakes his head vigorously. The next two follow his lead. The fourth one leans forward for a tentative stroke. "Ohhhh, it's so soft," she says. After that, most of the children touch the snake, adding more adjectives: "Bumpy," "rough," "like a basketball," "like plastic." When I'm done, I give the original skeptics a second chance to touch the snake. They tentatively reach out their curious little fingers and don't look nearly as repulsed. Their smiles remind me why I am in this profession.

Most zoo educators can describe similar moments in which students overcome – or at least question – their preconceived notions about animals. Whether the degree of this shift is measured or not, it feels significant at that moment.

Increasingly, studies are examining how modern zoos impact visitors' environmental attitudes (Marino et al. 2010; Rabb 2004; Smith et al. 2008). However, the findings are inconsistent. What's more, most studies have focused on adult education and attitude change (Falk et al. 2010; Marino et al. 2010). While engaging adults is important, Kahn (2002) argues that children should be the focus of conservation movements.

Since more than half of Americans now live in urban areas, many children will not regularly

experience nature as they grow up (Miller, 2005). For these children, the local zoo may be their closest or sole encounter with plants or animals. The presence of urban children at zoos therefore provides an opportunity to reach a population that may lack positive nature experiences. As Randler et al. (2012) explain, positive attitudes towards animals can translate to an interest in protecting animals and the environment. Zoos already present a multitude of animal programs designed for children and are in an ideal position to influence the next generation. But what is the true impact of these programs? This study approaches one aspect of this question by looking at how touching an animal impacts children's attitudes towards that animal.

Methods

Designing the Study

Working to fulfill their conservation education mission, the Oregon Zoo's Program Animal staff present classroom programs to around 5000 kids per year. This study was conducted in the Pacific Northwest-themed programs for 2nd to 5th grade classrooms. Focusing on local wildlife, students in these programs saw, and sometimes had the opportunity to touch, a Norway rat (*Rattus norvegicus*) or a gopher snake (*Pituophis melanoleucus*). They also saw, but did not touch, a Western screech owl (*Otus kennicottii*).

Simple, one-page surveys were designed with three questions each about a rat and a snake. The two questions evaluated for this study asked students 1)

how they felt when seeing the target animal and 2) invited them to describe it by circling simple adjectives.

Conducting the Surveys

Two weeks prior to the zoo presentation, teachers that had signed up for the Northwest-themed programs were invited via email to participate in this study. All nine classrooms that were approached agreed to participate. Teachers administered a pre-survey to the students a week prior to the zoo program. Zoo staff administered an identical post-survey immediately after the program. For all surveys, students were told their participation was optional and were instructed not to include their names.

The same zoo educator presented identical programs to participating classes with the only variable being which animal was touched and which was seen but not touched. Students were invited, but not required, to touch an animal. Zoo staff removed the surveys of students who chose not to touch an animal from the analysis.

Results

Response Rate

Nine classrooms from three different schools participated in these surveys. A total of 399 surveys were completed with 200 pre-surveys and 199 post-surveys. The rat and snake data were analyzed separately resulting in 200 pre-surveys and 199 post-surveys for rats and 199 and 196 respectively for snakes. The number of pre- and post-surveys differ due to indecipherable answers and one student who chose not to touch the snake; these surveys were removed from the analysis. While the pre-survey conditions established the baseline, the post-surveys measured variable conditions: four of the classrooms (N=80) did not touch any animals at all and five of the classrooms touched either the rat (N=45) or the snake (N=74).

Rat Results: "Seeing a rat makes me feel..."

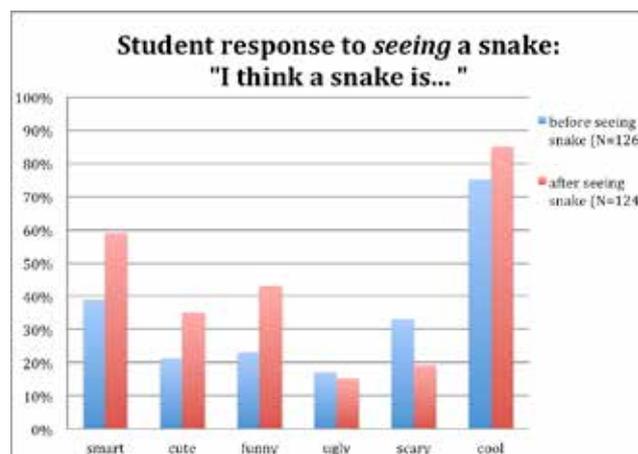
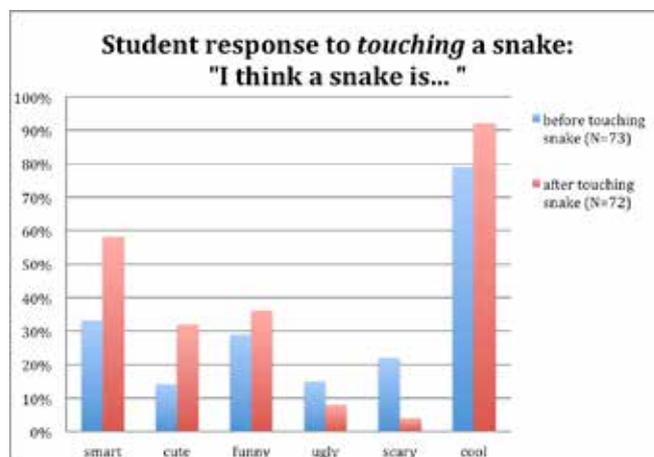
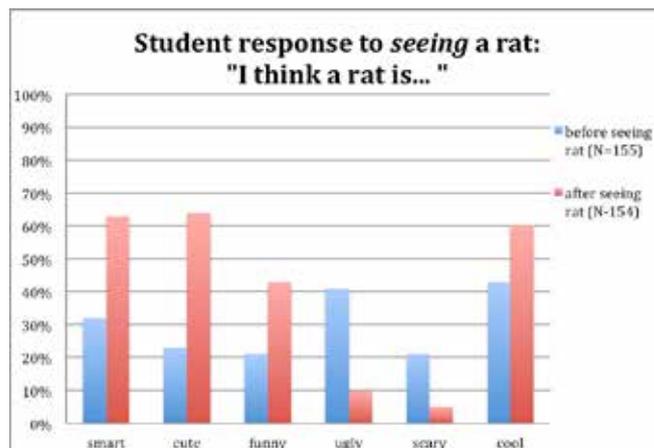
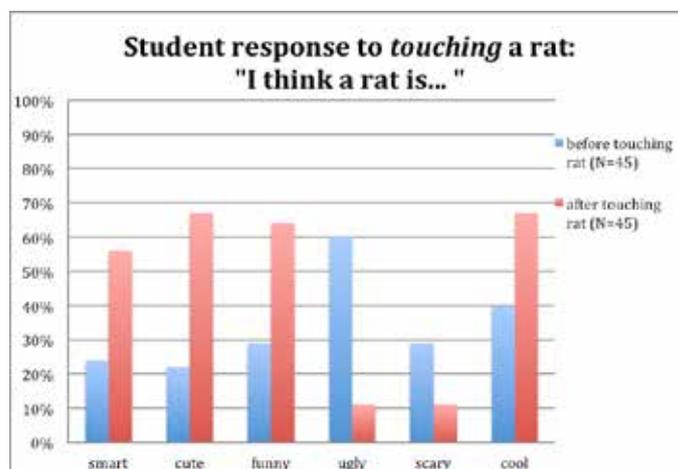
After seeing or touching an animal, students responded to the prompt: "Seeing a rat makes me feel..." by circling a happy, neutral, or unhappy face. Survey answers were assigned a value: 1 = happy, 2 = neutral, 3 = unhappy. Two classrooms (N=45) saw and touched a rat and seven classrooms (N=154) saw a rat but did not touch it. In both cases, students' attitudes toward rats improved after seeing or touching the rat. The changes were statistically significant according to an unpaired student t-test that revealed p-values lower than 0.05.

Snake Results: "Seeing a snake makes me feel..."

Three classrooms (N=72) saw and touched a snake and six classrooms (N=124) saw a snake but did not touch it. In both cases, students' attitudes toward snakes improved after seeing or touching the snake. The changes were statistically significant according to an unpaired student t-test that revealed p-values lower than 0.05.

Seeing One but Touching the Other

Three of the classes that saw (but did not touch) a rat did get to touch a snake. Conversely, two of the classes that saw (but did not touch) a snake did get to touch a rat. In addition to being lumped together in the above analysis, these classrooms were also analyzed separately to



determine if, for example, touching a snake made kids feel better about the rat even if they did not touch the rat. The results revealed that touching one animal did not significantly change their feelings about the other animal.

Descriptive Words: “I think a rat/snake is...”

For the second survey question, students were invited to circle all the words that they associated with that animal. The options were: smart, cute, funny, ugly, scary, and cool. There were some basic patterns in the results for both animals (Figures 1-4). More students described both snakes and rats as smart, cute, funny, and cool after seeing or touching them than before their experience. Fewer students described both snakes and rats as ugly or scary after seeing or touching them. More students initially perceived rats to be uglier and scarier than snakes; more students found snakes to be cooler than rats. Seeing and touching effects were very similar though touching a snake reduced the ugly and scary perceptions more than when just seeing the snake.

Discussion

Student Response to Touching or Seeing an Animal

In all conditions of this study, whether students were seeing or touching an animal, student attitude towards that animal significantly improved. Interestingly, starting attitudes towards snakes were more positive than starting attitudes towards rats. In the end, positive attitudes towards both animals were similar, with attitudes towards rats improving more dramatically than attitudes towards snakes. Rat or snake, touching or not touching, the results support the value of these zoo programs.

Shifting Attitudes About Icky Animals

A unique variable in this study is the likelihood that students came into the classroom with a prejudice against rats and snakes. Both animals often solicit negative reactions; rats for being farm pests and carriers of disease, and snakes for the threat that venomous snakes pose to humans worldwide (Randler et al. 2012). Randler et al. (2012) found that student contact with animals originally perceived as ‘disgusting’ reduced their feelings of disgust. This study’s results concur, evidenced by the strong decline of the use of ‘ugly’ or ‘scary’ to describe the rat or the snake. Since the danger these animals pose to humans is negligible in most regions of North America, zoos have a great opportunity to reshape preconceptions through their education programs.

Children and Animals: A Natural Pairing

As zoos reach for their conservation goals, one of the advantages they have is that children are regularly drawn towards animals as a part of their play and exploration. Whether it is a pet, a zoo animal, or a fictional character in books, games, or movies, children gravitate to activities that involve animals (Rud and Beck 1999). Many aspects of society and business show our recognition of this affinity

and not surprisingly, the most popular zoo programs are the ones that offer opportunities to interact with animals (Beck et al. 2001).

Unfortunately, there continues to be little research about how seeing or touching live animals affects emotions and learning (Randler et al. 2012). A few studies provide evidence for the positive effects that animal interactions have on well being, health, worldview, morale, and attitude towards the animal that was touched (Beck and Katcher 2003; Randler et al. 2012; Shiloh et al. 2003). Some teachers have observed that their students are calmer, more social, and eager to learn in the presence of classroom animals (Rud and Beck 1999; Rud and Beck 2003). Shiloh et al. (2003) found that petting an animal reduced anxiety regardless of that person’s general feelings about animals. And it wasn’t just the warm fuzzy animals that made a difference; the stress-reducing benefits of petting were experienced when petting a soft rabbit as well as when petting a hard-shelled turtle. Even though they are limited in number, these studies support the value of animals when teaching and interacting with children.

Future Studies

Even though this study did not conclusively show that touching an animal is more impactful than seeing an animal, the touching in these programs is limited to one or a few swipes of the hand. Can this really count as significant contact with an animal? Randler et al. (2012) found that closer, prolonged physical contact with an animal improved attitude towards that animal relative to less physical contact. How might attitudes shift if students were allowed to partake in more substantial contact in these zoo programs?

Anecdotally, this zoo educator has experienced the rapt student attention that comes with being the new visitor to a classroom. Surely the presence of the animals improves this novelty effect, but by how much? Building on a previous informal evaluation at the Oregon Zoo, a future study is being planned that will examine this question: If children learn from a zoo educator about an animal through images and artifacts rather than live animals, will similar positive attitude shifts still occur?

Finally, while this study measured the impact of the program animals on children’s attitudes, zoos must also consider the impact of these programs on the animals themselves. Whether it is a petting zoo goat, a raptor on the glove, or a rat in a classroom, it is possible that this intimate contact with humans is stressful for the animal. In a recent study, Farrand et al. (2013) evaluated several petting zoo species and observed that variable visitor densities and grooming by visitors did not solicit negative behaviors or impact the welfare of the animals. Meanwhile, Baird et al. (2013) collected cortisol metabolites and behavior responses from three species of program animals to determine their stress levels in relation to the amount of handling. Their results imply a threshold

for different species and different individuals at which point they seem to become more stressed. Further program animal welfare evaluations such as these, alongside educational impact studies, will help zoos better utilize and care for their program animals.

Conclusion

As children grow up in a society that is increasingly disconnected from nature, zoos are in a unique position to make a difference. By providing children with positive and meaningful animal encounters, zoos can have a profound impact on children's attitudes and the future of environmental conservation. This study offers evidence that seeing and touching animals improves attitudes towards those animals, supporting the value of program animals in zoo education. While more studies are needed, these results, combined with the awe in children's faces when they touch an animal, are enough validation for this zoo educator to continue providing this stimulating experience.

Acknowledgements

I'd like to thank Tanya Paul and Grant Spickelmier for their support and feedback in developing this study at the Oregon Zoo. Also, thanks to the students and teachers from the nine Portland area schools that participated in the study. Finally, thanks to the Global Field Program at Miami University for their support and encouragement.

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