

iZE

INTERNATIONAL ZOO
EDUCATORS
ASSOCIATION
JOURNAL

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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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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.

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From the IZE President, Rachel Lowry:

2016 has been another rewarding year to be President of the International Zoo Educators Association. Once again we broke a new record in securing the highest number of institutional memberships ever to support IZE. As such, I must thank our members, it's because of you that IZE is well positioned to progress our mission and help boost the capacity and impact of zoo-based education globally. This journal is yet another testament to the fact that zoos and aquariums around the world are doing great work in connecting our visitors to wildlife and inspiring conservation actions.



The IZE Board are very excited to be working with the talented team of educators at Fundación Temaikèn to deliver the 2016 IZE conference with a focus on Crafting Effective Narratives. I believe that the conference theme is a fitting description of the challenge that we face as zoo and aquarium educators. Educators are storytellers. At a time when we are losing more species to human-driven threats than ever before, our wildlife and wild places need zoos to lend their voice to tell their stories. However, the challenge is immense, as we need these stories to motivate social movements that go on to help alleviate threats to wildlife. To do this, we will need to be strategic with what stories we tell, how we tell them and of course how we evaluate them. With the continued support of the World Association of Zoos and Aquaria, and of course our incredible membership, I have no doubt that we'll rise to this challenge.

Once again, I must thank the authors of our papers for sharing your brilliant work, the IZE Board for driving progress against our mission and ensuring that IZE is the strongest association it has ever been, and of course Stephen Woollard, our IZE Journal Editor who once again has delivered a terrific journal.

I hope that you enjoy the 2016 edition of the IZE journal. I, along with the IZE Board, are very much looking forward to working with you all to further transition zoos towards being powerful conservation organizations.

Onwards!

Rachel Lowry, President of IZE (2012-2016)
Director of Wildlife Conservation and Science,
Zoos Victoria, Australia

Welcome to the next IZE President, Isabel Li



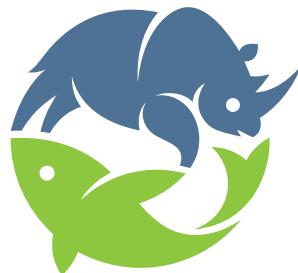
Isabel is currently the Education Director at Ocean Park, Hong Kong. Isabel's passion for the environment started in her teenage years when she was the Student Environmental Protection Ambassador for her secondary school. Since then, she has engaged and organized various environmental education events. She joined Ocean Park as an educator in 1999 and became the Education Manager in 2008. Her academic background includes a MSc in Environmental Science and Technology and a BSc in Environmental Science. Her interest is in studying visitors' behavior in the zoo/aquarium and how the experience impacts them and creates positive behavior change. Her life goal is to influence the Hong Kong public to live a sustainable life, especially not to consume shark fins anymore.

Isabel takes up the President's role on conclusion of the IZE conference in Argentina in October.

Contents

IZE Journal No.52 - 2016

- 3 From the President, *Rachel Lowry*
5 From the Editor, *Stephen Woollard*
6 How the Release and Capture of Endangered Birds Has Captured Our Youth
Kerry Staker, Australia
9 Impacting students through interactive interpretation regarding a relatively unknown state endangered species, the Eastern hellbender
Noah Shields & Amber Frederick, USA
12 Interaction between research and practice: the experience of an environmental education proposal for the black lion tamarin conservation at Sao Paulo Zoo, Brazil
Camila Martins, Katia Gisele de Oliveira Rancura, Hydee Torres de Oliveira
16 Future for Wildlife Programmes: Changing minds and attitudes of youth in the city of Singapore
Vera Yang, Singapore
20 Meet the Locals He Tuku Aroha - A case study on taking a collaborative approach to programme development
Lynn Allan, New Zealand
23 Exploring Our Interpretive Practice: An Impact Evaluation
James Marshall, USA
27 Application of Evaluation in Zoo Summer Camp Projects
Ma Haiyan, Bai Yali & Zhou Liya, China
31 EAZA Campaigns as A Tool for Securing Funding
Marta Zajac-Ossowska & Radoslaw Ratajszczak, Poland
33 Biodiversity is Us: International Education Campaign, Buenos Aires Zoo
Natalia Marusak & Marcela L Diaz, Argentina
36 Can Exhibits Transform the Adult Visitor into the Adult Learner
Brian Ogle, USA
39 Investigating factors which affect visitor understanding of the information displayed on species signs: a multi-method evaluation approach
Tracy Dove, UK
43 Birds of Paradise and Sexual Dimorphism: Using zoos to inspire conservation in New Guinea
Zoe Vrieling, USA
45 What will it take to make you love me? Sparking love for local wildlife needs a fresh approach.
Emily Dunstan & Genevieve Johnson, Australia
50 Sensory Trail for the inclusion of people with disabilities in conservation education programmes
Miguel-Angel Vieyra-Guzmán, Mexico
54 Animal Training Lessons - what can we apply to our visitors?
Gabby Harris, South Africa
57 Visitor Study at Barranquilla Zoo: Time & Tracking
Alejandro Valencia Pérez and Paola Sierra Manrique, Colombia
61 Family Conversations at an Orangutan Exhibit: The influence of zoo educators
Jenn Idema & Patricia Patrick, UK
64 Gaining Knowledge and Changing Attitudes following interactive experiences at the Attica Zoological Park, Greece
Malene S. Nielsen, Elmos Panagopoulos & Dr Georgina Spyres



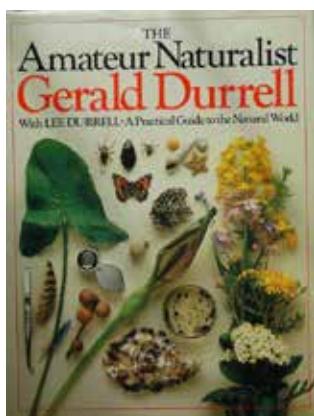
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From the Editor: Stephen Woollard

Be inspired... Most of us can think of one or two people or events that significantly influenced and inspired us to do the work we do. Many people will no doubt mention broadcaster Sir David Attenborough who was 90 this year, or perhaps your parents? I expect many of us may have had at least one inspiring teacher, and we may all recall an experience of nature that had a significant impact upon our future careers.

This year I was delighted to be asked to do an education workshop for a group of international conservationists attending the Durrell Academy in Jersey. It was an honour and privilege to contribute to the training of some of '*Durrell's Army*', not least as it was meeting Gerald Durrell himself over 30 years ago that inspired me to work in zoos and conservation.

Those you that are familiar with Gerald Durrell's work will know that he was a major influence in the development and role of zoos in conservation and the field, and that the International Training Centre (now Durrell Academy) was one of his greatest gifts to the world. One of those people supported and championed by Durrell, is now an inspiration for many others - and that is the winner of the 2016 Indianapolis Prize, Prof Carl Jones, (Durrell & Mauritian Wildlife Foundation), who is credited with saving nine species from extinction! Few of us can claim such a great achievement, but together we do have an impact which ranges from inspiring and exciting others in the natural world, to encouraging and enabling behaviour change that contributes to sustainable living.



One of the ways that Gerald Durrell inspired others was through his writing and sharing his knowledge - something which the IZE Journal enables our community to do. Whilst I was initially inspired by Gerald's books of his expeditions and childhood, there is one of his later works, written with his wife Lee Durrell, that I would recommend to everyone and that is '*The Amateur Naturalist*' (Dorling Kindersley 1982). This book reminds us that nature is all around us and can be discovered and explored by everyone. It is also a good 'teacher', building upon the experience that a young Gerald Durrell had in Corfu, with encouragement from his unofficial tutor, Dr Theodore Stephanides:

"Theodore had an apparently inexhaustible fund of knowledge about everything, but he imparted this knowledge with a sort of meticulous diffidence that made you feel he was not so much teaching you something new, as reminding you of something which you were already aware of, but which had, for some reason or other, slipped your mind." — Gerald Durrell, My Family and Other Animals, 1956

This 52nd edition of the IZE Journal features 18 articles from across the world. Thanks to all of the authors and the excellent team on the IZE Board that have helped to source these diverse reports featuring: visitor studies; campaigns; conservation; behaviour change; programme development; interpretation; education programme activity; & adult education.

I hope that reading the journal and engaging with the IZE community encourages you in your work and inspires you to write up your own work to share with others - submission for the IZE Journal 2017 are welcome (deadline March 2017).



Stephen Woollard with the statue of Gerald Durrell,
Durrell Wildlife Park, Jersey, April 2016



Release and Capture ‘How the Release of Endangered Birds has Captured Our Youth’

Kerry Staker

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Abstract

In 2013 and 2015 Taronga Youth at the Zoo (YATZ) volunteers attended ‘Camps of a Lifetime!’ and assisted Taronga Zoo Bird Keepers in the release of two separate groups of captive bred birds into Mount Pilot National Park with the regent honeyeater (*Anthochaera phrygia*). Once endemic to the east coast of Australia, the bird’s decline has been dramatic in the last 40 years, and is now critically endangered on the IUCN Red List. While on the camps, the YATZ also visited a local school near the release site and educated students about their new birds.

The camps have proven to be vital in the attraction and retention of YATZ volunteers over the last few years and have dramatically increased participants’ understanding and commitment to conservation. Many have become leaders in the program and have made active efforts to participate in and educate others about conservation programs and initiatives.



“YATZ with special guest Jane Goodall at Youth EnviroForum 2014” – photo credit Rick Stevens

Background

The Taronga Zoo Youth at the Zoo (YATZ) program began in 2001 with 20 teenagers with the primary focus of vocational training and experience in zoo keeping. Since then the program has grown and currently has 347 active members with conservation education being the core focus with the purpose of ‘helping others take positive actions for the conservation of wildlife and their environments’. YATZ take part in many activities in and out of zoo grounds and time with zoo keepers is only one of over ten activities; others include supporting the

Zoo’s Conservation Campaigns, assisting with ‘Zoo Adventures (a vacation care program for 5-10 year olds) and devising and delivering YATZeD (informal education lesson devised and run by YATZ Leaders for other YATZ).

The endangered regent honeyeater (*Anthochaera phrygia*) has been held at Taronga Zoo since the mid-1990s and has been bred for release since 2000. Bird keepers in the Australian Fauna Division manage

and maintain these birds with advice from vets and curators, and the releases occurs in Mount Pilot National Park in Chiltern, Victoria in conjunction with BirdLife Australia and the Victorian Government.

Chiltern is a small rural town with a population of less than 1100; it has two local primary schools (with student numbers 100-115), and no high school.

Regent Honeyeater Releases

Previous regent honeyeater

releases in Chiltern were conducted in 2008 and 2010. In 2010, Taronga Zoo Educator, Rod Cheal, accompanied the keepers and taught the local students at two primary schools about the endangered bird, its release, as well as conservation actions the students and the community could take to ensure their success of the species. Actions included responsible rubbish collection and keeping pet cats indoors. While this was considered successful and created new relationships with the two local schools, it was not followed up in any particular way.

2013 was the first release of these birds in which YATZ were involved. YATZ Educators approached Taronga Zoo Bird Supervisor, Michael Shiels, to seek permission for YATZ to support the release, as previous release debriefs had detailed the lengthy set up process of release tents and browse collection.

YATZ were invited to submit an 'Expression of Interest' to attend the 5 night camp, with over 25 applications received, of which 15 teenagers were chosen.

YATZ Camps- 2013 and 2015

In April 2013, 15 YATZ and two staff travelled 600kms by mini bus from Sydney to Chiltern.

On Day 1 the YATZ assisted 2 bird keepers to erect and furnish four release tents, with branches, browse, water and food containers. The keepers provided supervision and training for eager teenagers who loved the idea of being in the bush preparing a site to release endangered birds into the wild. The YATZ assisted keepers to collect the birds from the airport, process the birds; which involved health checks and applying trackers; and settle them into their temporary accommodation tents,



erected with the keepers in the days preceding, saving money and time. Importantly, two days were spent at the local primary schools educating the local students about their 'new' birds and the importance of looking after their habitat. This was considered highly valuable by the teachers in those schools (Dinsdale Classroom Teacher, St Joseph's Catholic Primary School, 2013, pers. comm., 15 April).

When release day came, all YATZ attended, with locals and agencies such as BirdLife Australia, Monash University and La Trobe University and the Victorian Department of Water, Land and Environment. Two YATZ were invited to assist the keepers and some other key stakeholders to open the tents to allow the birds to make their way into their new home in the Mount Pilot National Park.

Those who attended the release emotionally connected with the animals, with one Taronga Zoo staff commenting, "Many zoo keepers with years of experience could only dream about releasing their animals into the wild!" (Brown, Supervisor of Backyard to Bush, Taronga Zoo 2013, pers. comm., 16 May).

By 2015 the regent honeyeater release program had grown in reputation among YATZ, with applications growing to 45, with again only 15 being chosen. The value of this selection process has been commented on by parents of YATZ who hope their children will learn important vocational and life skills from applying for the program (Adamson J, YATZ Parent, Taronga Zoo 2013, pers. comm., 19 June).

The camp in 2013 was so successful that the formula was repeated in 2015, with some changes made to activities to enhance previous learning delivered two years prior

Reflections

The keepers enjoyed both the practical help and the company of teenagers with similar mindsets to their own and were impressed by the maturity of these young people. "Thanks guys for all your help. Your enthusiasm was addictive and your determination and helpfulness was admirable!" (Michael Shiels, Supervisor of Birds, Taronga Zoo – comment on Facebook, April 17, 2013).

Many of the YATZ expressed that they had now found a group that understood their concerns for the environment and didn't think they were 'weird' for wanting to pick up rubbish or spend hours sitting in the Australian bush spotting birds and other animals. 13 out of 14 YATZ also stated they learnt all that they know about the endangered bird from the camp they attended. "... I want to thank you all so much for being a part of this week and especially to Rod and Kerry for giving me the opportunity to spend a week with people who do pretty much exactly what I want to do when I grow up. It was such an invigorating and inspiring experience and all of you made it that much more worthwhile. I can't think of a better group of people to have done this with, and I feel honoured and privileged to call myself a RHE YATZ" (Elizabeth Morrison, YATZ member – comment on Facebook, April 18, 2013).

100% of camp attendees stated they made friendships they still consider valuable. Anecdotally, their passion for wildlife conservation was ignited or enhanced and their confidence to speak up for their cause also increased. They continue to be passionate and active in their communities and schools; many have created 'green groups'; started fundraising campaigns and have spoken to their whole schools at assemblies about their concerns.

Conclusion

The 2013 and 2015 regent honeyeater releases involved Youth at the Zoo volunteers in a fashion previously not practised. The overall positive result is encouraging and many YATZ believe these experiences are among the best things they have ever done, creating young people who are well on their way to becoming global citizens.

Providing teenagers with the opportunity to participate in these programs and giving them direct and meaningful access to the field, sparks a passion

for conservation and creates positive memories. The YATZ may have attended a 'release' but in the mind of this author – I feel they were 'captured' by the activities – the birds – the keepers – and the important conservation work zoos engage in.

Acknowledgements

The author would like to thank fellow Taronga Zoo staff, Michael Shiels and Katie Horsburgh and the Bird Division, Rod Cheal, Cate Webster and Dean Ingwersen; BirdLife Australia, Glen Johnson; Department of Environment and Primary Industries and mostly the YATZ and the birds.

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Impacting students through interactive interpretation regarding a relatively unknown state endangered species, the Eastern hellbender

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Columbian Park Zoo, United States

Abstract

The Columbian Park Zoo developed a partnership with a local school district to provide an interactive, interpretive program to all sixth grade students (11-12 years) focused on Eastern hellbenders (*Cryptobranchus alleganiensis*). This program was aligned to Indiana state academic standards in science and targeted watershed conservation and human impact on the environment. The program employed many interpretive learning tools as well as a live animal encounter with a comparable salamander species facing similar threats. Five hundred underserved, urban youth were reached and students demonstrated an increase in knowledge and awareness of hellbenders from a pre/post-test format. This program sought to leave students with a higher level of awareness and knowledge to aid hellbenders in the wild.

Introduction

In late 2014, the Columbian Park Zoo embarked on a partnership with Purdue University in an effort to strengthen a head-start program for the state endangered Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*). This partnership joined an already existing project that was geared to head-start captive-hatched (from wild-collected eggs) hellbenders. This unprecedented opportunity was met with eager excitement from Zoo staff, and spurred the Zoo's newly formed Conservation Committee to design a robust conservation education campaign surrounding the newly arrived hellbenders.

Eastern hellbenders are a species of salamander and were historically found throughout Southern Indiana, USA, in rivers and streams surrounded by woodlands. Over the last several decades, there have been drastic population declines throughout the state attributed to increased pollution and negative effects from human land usage surrounding their natural habitats (Nickerson and Mays, 1973 & Briggler et al., 2007). This species is now localized to one small area in the Blue River in Southern Indiana and has been documented as having one of the lowest population densities in state history (Burgmeier, et al., 2011). Since Lafayette Indiana is part of the extended Blue River watershed, the Zoo's conservation efforts were heightened and focused to aid this species.



Zoo staff presenting to one class of 6th grade students & interpretive interactive demonstrates cumulative effects of discarding trash and debris giant



Columbian Park Zoo accepted three juvenile Eastern hellbenders into its collection in 2015. These juveniles were to be reared in the safety of the Zoo and monitored by Zoo staff for later release back into the wild. Because of space limitations, these animals were housed behind-the-scenes without opportunity for public display. The logistics of this presented a hurdle for the members of the Conservation Committee, whom were now designing an education and outreach campaign tailored to this species. The main challenge was how to best educate the local community about an animal that is not naturally found in the local ecosystem and an animal that is not on exhibit at the Zoo.

As logistical problems were being tackled, an education and outreach plan was formulated. It was determined that many of the key points in the plan were to focus on the hellbender habitat and watershed quality. A “big idea” message for the program was adopted to guide any outreach and education efforts henceforth. The “Healthy yards lead to healthy hellbenders” message allowed the Zoo to connect local community members to this species that many have never heard of or seen. The main goal was to guide the community in realizing that their actions at home and around the city do impact organisms in other locations through the processes of the watershed. Conservation behavior outcomes were designated that supported the big idea message and began to shape what events and programs that the Zoo was going to host.

The main headlining event for the hellbender conservation program was “Help the Hellbender Day” at the Zoo. This was a community event where local community conservation partners joined forces with Zoo staff to educate patrons on the importance of water quality and watershed management. Partner booths were highly interactive and geared toward young children and families. This event also gave the community an opportunity for guided behind-the-scenes tours to view the Zoo’s resident Eastern hellbenders.

The “Help the Hellbender Day” event was highly successful, but the conservation committee aimed to reach even more of the local community. A partnership was developed with the local school district. Zoo Education staff designed a presentation to be delivered to all sixth grade students in the partner district in November 2015. A generous gift from Tri Kappa – Lafayette Delta Eta Chapter made this outreach program possible and the Zoo staff was able to reach 500 local students that would not otherwise have received this messaging. The challenge was designing an interactive interpretive presentation that connected students to a relatively unfamiliar animal

needed to be designed to impact students’ knowledge, awareness, and attitudes regarding hellbenders and their conservation, while complimenting existing state academic standards for science.

Methods

Two Zoo staff members were responsible for delivering the presentations. These specific staff members were the two primary animal care staff managing Eastern hellbenders on-site. Both individuals were well-versed, had personal interest in hellbender conservation and had training in the zoo education field. The program introduced the hellbender and discussed some of its natural history including morphology, habitat requirements, factors of endangerment and the reasons behind the necessity of salamanders and other amphibians in ecosystems. Since hellbenders are fully-aquatic and very sensitive animals, a model of an adult animal was used for any and all discussions, rather than live hellbender specimens. The program was designed as a 20 minute interpretive presentation that included engaging demonstrations, interactive learning opportunities and a live animal encounter with a similar species, the Eastern tiger salamander (*Ambystoma tigrinum*). Visuals and interactive demonstrations were included that allowed students to understand and see representations of several abiotic factors that are negatively impacting hellbenders, including increased sedimentation, pollution, and debris from runoff in storm drains. One such interactive was a miniature replica of a street with a storm water drain. This interactive allowed students to take one piece of trash each (one piece they thought wasn’t a big deal to toss on the street) and toss it onto the street and see the cumulative effect of their entire class. The highlight of the program for students was the live animal encounter with the Eastern tiger salamanders. Students learned that many of the same threats hellbenders are facing also impact these more common salamanders. The program culminated



with discussion pertaining to good environmental behaviors students should be demonstrating to save these amphibian species. Since many of these local students reside in urban areas, action steps included both private yard care and responsible use of public green spaces.

This program was offered over the period of three consecutive days and students were brought to the presentation with their science classes during the regular school day. This schedule resulted in classes rotating every 30 minutes for a 20 minute presentation. Teachers were asked to have their students complete a pre-test prior to the start of the first program and a post-test after their classes completed the program. These evaluations were completed on-line via students' school iPads. Of the 500 students that participated in the program, 281 students completed both the pre- and post-tests.

The student evaluations had a combination of knowledge-assessment items and Likert-scale items (to assess attitudes) for a total of 12 items. Five knowledge items focused on habitat requirements and general watershed information. These items were designed as True/False items to accommodate students with a variety of learning styles and reading levels. The seven Likert-scale items were focused on attitudes and awareness regarding human impacts on the environment, specifically hellbenders, and were evaluated on a five-point scale.

Results

According to the pre- and post-test knowledge scores, students were able to increase their knowledge by approximately two letter grades. On average, students scored 64% on the pre-test and 83% on the post-test which yielded a 45% score increase. These scores were only tabulated from students that completed both the pre- and post-tests. Students that completed only one of the assessments were excluded in the data analysis.

The Zoo staff was most keenly interested in how these interpretive presentations were going to impact students' attitudes and awareness regarding hellbender conservation. It appears that the majority

of students were undecided on many of the items on the pre-test as many of the averages were between 2 (Agree) and 4 (Disagree) and relatively close to 3 (Undecided). After students' completed the program, the assessment averages started leaning away from Undecided. The pre-and post-test averages per item and the associated percent changes in scores are outlined in the table.

Throughout all of the scheduled programs, students appeared very receptive and most were actively engaged during the interpretive presentations. Presenters, school staff and students were all pleased with the quality of the programs and were excited about exploring potential similar partnerships in the future.

Discussion

This project was successful in developing a unique community partnership that provided Columbian Park Zoo with an opportunity to further meet its mission and allowed local sixth grade students an interactive learning opportunity that otherwise would not have been afforded. As an explorative study, it does appear that a short 20-minute interpretive presentation was able to impact students more than was expected. It appeared that prior to participating in the program, students had relatively little knowledge and awareness about hellbenders and their conservation. This was not unexpected because, even though the Eastern hellbender is a state native species, it is not native to the geographic area in which the project took place. After completing the program, students demonstrated more awareness of their conservation.

Even though this project saw impacts to students' knowledge, attitudes, and awareness, it was one snap shot in time. In the future, it would be interesting to determine if these types of programs are impactful on a longer timeframe after the program. It is unknown if these 20-minute interpretive presentations were really able to impact students' behaviors or long-term attitudes towards Eastern hellbender conservation.

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Likert-Scale Item	Pre-Test Average*	Post-Test Average*	Percent Change
I think hellbenders are in trouble in Indiana.	2.584	1.761	-31.85%
Amphibians like hellbenders and other salamanders are important to protect.	2.046	1.461	-28.59%
There are things I can do to help hellbenders	1.888	1.334	-29.34%
Things in my yard can affect habitats in other places.	2.361	1.617	-31.51%
My actions don't impact hellbenders.	3.198	4.116	28.71%
It doesn't matter if amphibians like hellbenders and other salamanders go extinct.	3.189	4.2	31.71%
Hellbenders are doing fine in Indiana.	3.715	4.144	11.55%

Interaction between research and practice to create an environmental education proposal for the black lion tamarin conservation at São Paulo Zoo, Brazil

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The São Paulo Zoo has experience in educational practices about biodiversity conservation, but the environmental education research is developing and little interaction between practices and theory is observed. This interaction could be strengthened by using participatory methodologies that promote the exchange of knowledge among zoo professionals and the interplay between practices and research. The objective of this study was to discuss the contribution of the participatory methodologies used during our master's research experience of designing and implementing an educational proposal at São Paulo Zoo, as a possibility to bring closer EE research and practice. This study highlights the feasibility of developing a participatory proposal in informal education institutions which have hierarchical structures, allowing the interaction of several professionals, practices and theory.

Zoos are of great relevance for wildlife conservation. Among their missions are the research in wildlife conservation; the development of conservation projects that allows interactions among in-situ and ex-situ conservation professionals; the leisure and entertainment of public; and, finally, educational activities (Auricchio, 1999; Conway, 1969; 1995; 2003; Knowles, 2003; Miller et al., 2004; Patrick; Tunnicliffe, 2012). Zoos are very important for environmental education practices toward changing attitudes and values about the socio-environmental context in which we live, considering that a significant part of society lives in urban areas and has little contact with natural elements (Conway, 1969). One of the main areas to be developed in these institutions to overcome the anthropocentrism in our societies is biodiversity conservation (Dreyfrus, Wals, Van Weelie, 1999; Van Weelie, Wals, 2002; Navarro-Perez, Tid-Ball, 2012).

According to the World Association of Zoos and Aquariums [WAZA] the zoo and aquarium community worldwide welcomes over 700 million visitors annually. São Paulo Zoo (Brazil), has approximately one and a half million visitors every year and is one of the most important zoos in Latin America and the largest in Brazil. Its 90-hectare area has over 3,000 rare and endangered animals of several species. The zoo is located in Fontes do Ipiranga State Park, a protected area of Atlantic Forest inside an urbanized area which has a high population (Fernandes et al., 2002). Nowadays, São Paulo Zoo has a staff of approximately 400 across departments.

In addition to the development of environmental education practices, the São Paulo Zoo also contributes to conservation projects for threatened species, for example the conservation programme



Figure 1: The space-that-educes "On Kinha's Trail" at São Paulo Zoo.

for black lion tamarin (*Leontopithecus chrysopygus*), which develops research on different fields (biology, ecology, genetics and environmental education) about this threatened species endemic to São Paulo's Atlantic Forest. Within this Program, a new 'exhibit' was inaugurated at São Paulo Zoo on August, 2014, a space-that-educes called "On Kinha's Trail" (Figure 1), whose goal is to provide an interactive space for the public, where they can learn about the species' biology and ecology, understand the threats to its preservation and the main conservation actions undertaken by various institutions, and also learn how to participate and contribute towards the species conservation.

This space-that-educes is the result of a master's project aimed to design and implement an educational proposal about black lion tamarin conservation, and also to promote the interaction between the methodological research techniques and the educative practices at São Paulo Zoo, allowing the participation and exchange of

knowledge among different professionals, such as biologists, veterinarians, educators, students, directors and others. The research was outlined in four steps: 1) the development of participatory diagnoses with 19 Zoo's professionals (including biologists, veterinarians, educators, designers, engineer and directors) to define the educative elements; 2) the planning of an educational proposal for the space-that-educates involving the same professionals above, which contains the description of all the educative elements and contents about black lion tamarin and Atlantic Forest that could be included; 3) the implementation process involving over 30 São Paulo Zoo's staff; and finally 4), the reflexive analysis about the design and implement process with the participation of all those people involved in research (Martins, 2015).

It is important to emphasize that this whole process was not only conducted by educators. The zoo's community was encouraged to reflect on their experiences and technical knowledge and to participate in all the research steps to design and implement an educational proposal about black lion tamarin conservation. Wildlife conservation is a complex and multidisciplinary task; therefore, the development of a research process which values the interactions among professionals at different areas of an institution is really important to implement activities in this field, considering on a critical environmental education perspective.

In São Paulo Zoo, the educators' team has an Environmental Education Program and great experience in educational practices for a wide variety of audiences, including guided tour for students, training programs for teachers, exhibitions, special program for elderly people and educational campaigns. However, the environmental education research is incipient and there is little interaction between the practical experiences with theory and research methodologies.

According to the Association of Zoos and Aquariums [AZA] only 40% of the zoos in the world include research as an essential component in their missions (Benirschke, 1987; Patrick et al., 2007). This seems to be linked with the intense demands of zoos routines and the lack of a team to carry out research in an integrated manner.

In the educational context, Oliveira & Oliveira (2014) investigated environmental education research developed in Brazilian zoos and found only 21 Master's investigations and one PhD thesis, but all of them were developed in universities, mainly in Post-Grad Programs, having zoos only as a space for conducting their investigations.

Based on these issues, the objective of this study was to discuss the contribution of the participatory methodologies used during our masters' research

experience of designing and implementing a space-that-educates at São Paulo Zoo, as a possibility to bring closer environmental education research and practice.

Methodological approach

In Brazil there is a large experience on using participatory approaches to implement educative practices allowing the involvement of the community, and participation is an essential element for environmental education research and practice (Figueiredo, 2013), which proposes to encourage dialogue between those who are involved in the educational process (Freire, 1994). In this field, researchers and educators frequently use participatory and discussion to overcome the social and environmental impacts (Oliveira, 2013).

An educative proposal that is critical and political should be planned in a participatory perspective, giving value to the knowledge of different participants in order to establish a space of trust (Santos; Costa-Pinto, 2005). Based on this, the interaction between environmental education research and practices could be strengthened by participatory approaches, as Action Research, Participatory Research or Participatory Action Research (Brandão 1999; 2000; Thiolent, 2000; Barbier, 2004).

To design and implement an educational proposal concerning black-lion-tamarin conservation, the option chosen was to articulate the practical experience of zoo staff and the theoretical and methodological framework of research, using Participatory Action Research. In addition to this perspective, the selected option was to design and implement not a mere space, but one that has an educational intention that ought to provide experiences to inspire people to change attitudes, positions and values. This is the "space-that-educates" concept, a term proposed by Matarezi (2000, 2005, 2006) which was used as a theoretical framework. Participation and involvement are essential for the planning of a space-that-educates. Following these theoretical perspectives, a focal group with five Zoo professionals who had participated during the whole process was developed to grasp their perceptions regarding this participative approach and to understand same aspects that could contribute to bring research and theory closer for the zoo's professional routine.

Perceptions of São Paulo Zoo professionals about the contribution of the participatory approach during the implementation of "On Kinha's Trail"

At the focal group, the participants emphasized the potential benefits of using participatory methodologies in critical environmental education research. These are: the diversity in participation levels during the process; the researcher's attitude and role; the establishment of a reliable space with the zoo's professionals; the essential interaction between research and practice; and, finally, the potential of transformation in this participative educational process, which

establishes new sources for further practices. The most significant of these included the exchange of knowledge among the São Paulo Zoo's professionals and the interaction between research and practice.

The design and implementation process of "On Kinha's Trail" involved a wide range of people, who contributed with their experience and knowledge from areas such as animal management, nutrition, education, administration, animal welfare, engineering, visual communication, veterinary and others. Based on this, we observed heterogeneity of actions that contributed to enrich the educational proposal, respecting the peculiarities and limitations of each person involved, characterizing a democratic educational process. Oliveira (2013) highlights that an educational process created on a participatory perspective have different approaches and participation levels. In this case, it is believed that educational practices or researches on a participatory perspective which considers the homogeneous participation of the people involved reflect a naïve perspective of environmental education, which doesn't value and understand the contexts, feelings, knowledge and demands of each person and even doesn't provide freedom, reflection and empowerment of the people involved. The heterogeneity and diversity of participation is essential to conduct educational practices and critical environmental education research.

Based on this participatory perspective, we appreciated and value the practical experience of São Paulo Zoo's professionals and brought the theoretical and methodological framework to the reality of educators, sharing a new knowledge. It was noted that the educators' team did not have a specific time to discuss about environmental education research and about how they could integrate this field in their routine. Even so, they had a desire to study and understand the theoretical and methodological approach used in research. The participatory process developed to design and implement the space-that-educates also contributed to establish a partnership among researchers and the zoo's educators and to show some paths to be followed by the educators' team in order to strengthen the interaction between their practice with research and theory approach.

For these reasons, an Environmental Education Research Group at São Paulo Zoo was created as an interesting and unexpected result promoted by the partnership among researchers and educators during this study. The formation of this Research Group came from the interests and desires of the zoo educators' team to understand the ontological, epistemological and methodological characteristics of environmental education research in order

This Group started on January, 2014 and since then we have already analyzed several types of guided tours, submitted one paper about a Teacher Training Program and developed an Educator Formation Course at São Paulo Zoo.

Final thoughts

This study offers a contribution about potentialities of participatory methodologies to strengthen the relation between practice and environmental education research at zoos. Based on the relevant and original process developed to design a space-that-educates at São Paulo Zoo, there are aspects that show the importance of participatory perspectives to integrate practical experiences with research.

It was a challenge to develop this educational and participatory process involving so many professionals with different routines and activities. Even so, this study also highlights the feasibility of developing participatory educational activities and research in informal education institutions which have hierarchical structures involving several departments and professionals. We hope this experience could inspire other zoos to design and implement their own space-that-educates in a participatory perspective and perhaps establish a group to discuss the theoretical and methodological frameworks in their educative practical experience.

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Future for Wildlife Programmes – Changing minds and attitudes of youth in the city of Singapore

Vera Yang

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Introduction

Singapore is a metropolis, its cityscape towering and economy ever-developing. On its express route to development from a British colonial state to a highly-industrialized independent nation, economic development has been a way to measure its progress (Neo, 2007). Perhaps it is for this reason that Wee et al (2006) found that Singaporean students tended to have an anthropocentric view on natural resource use. Environmental education tends to take a utilitarian and pragmatic slant in the Singapore education system, despite the progressive rhetoric that is used in teaching (Wong and Stimpson, 2003). In its efforts to enhance environmental sustainability, the Singapore government has set new targets to increase naturalistic areas and encourage community stewardship by 2030 (Ministry of the Environment and Water Resources and Ministry of National Development, 2015).

Khew et al (2014) recommends engaging citizens in “specific education in ecology/conservation” to change their landscape preferences to ones that may result in biodiversity conservation. We developed the Future for Wildlife programme to complement the government’s efforts to reconnect city-dwellers to nature.

We have identified youth (ages 15 to 21) as a key target in our efforts to tackle the prevalent utilitarian view on wildlife and natural habitats. The Future for Wildlife programme was conceptualized with the following aims:

1. To help students forge connections with wildlife
2. To create awareness among youth of the current threats to wildlife conservation
3. To promote understanding of the role of zoos and aquariums in conservation
4. To facilitate youth in reaching a synthesis of their experiences in the programme with their current worldview

Ultimately, we hoped to prime them to make informed, conservation-minded decisions that would have positive effects on wildlife in the future.

The Future for Wildlife Programme

The Future for Wildlife programme was launched in November 2014, and repeated in November 2015. The participating students were Secondary school students (all 16 years old) from

a local girls’ school. It was run as a four-day, one-night camp in which the students visited all four WRS parks (Singapore Zoo, Night Safari, River Safari and Jurong Bird Park).

The variety of activities in the programme were designed to create unique experiences with animals in the parks’ collections and stimulate thought-provoking discussions. To ensure the students received a spectrum of experiences, we presented activities that ranged between being species-centric and emotive in nature, to ecology-centric and connection-based. We categorized the activities into three experience levels with increasing levels of broadness: “Teaching through Sharing”, “Hands-On Activities” and “Conservation beyond the Zoo”. Native wildlife conservation, ex-situ conservation in WRS and career guidance were recurring themes throughout the whole programme.

Teaching through Sharing

At the species-centric level, the students were engaged by talks and tours led by keepers, conservation experts and education staff. These activities often involved animal encounters and personal sharing sessions. The goal of this set of activities was to bring wildlife conservation to a personal and emotive level, while still being informative.

1) Animal Encounters

We created opportunities for the students to encounter animals like African penguins (see Picture 1 below), ball pythons and pangolins at close range, while sharing facts and conservation messages with them.



2) Talks by Keepers and Conservation Experts

We arranged for the students to meet and interact with keepers and other field experts to share their experience and knowledge.

Among the invited speakers was a representative from our own Conservation and Research Department, who spoke about WRS' collaborations to conserve an endemic freshwater crab, the *Johora singaporenensis*. The talk highlighted the challenges of saving a nondescript, uncharismatic and endangered species from extinction.

3) Back-of-house Visits

Ex-situ conservation work in WRS depends heavily on professional healthcare, nutrition and husbandry practices. To help them appreciate their importance, the students were brought on tours of the back-of-house areas at animal exhibits and veterinary facilities to see how such conservation work is carried out.

4) Interactive Workshops

The students learned about giant panda research and conservation through an interactive station-based workshop where they completed activities through observation and inference (see Picture 2 below).



In another workshop, the students worked in groups to “build” a town next to a waterway. They simulated the experience of making decisions that balanced environmental conservation, with economic development.

Although simulated, these workshops were based on real situations. Their purposes were to create awareness and spark interest for further self-exploration.

Hands-On Activities

To foster a sense of ownership for wildlife and wild habitats, we designed a series of activities where the students carried out actions that directly benefited

animals in our collection, or initiated their own learning.

1) Keeper Experiences

The students were attached to an animal section for a few hours to help zookeepers with daily husbandry. These experiences, although short, gave them an authentic experience of being directly responsible for the animals' welfares.

2) Animal Behaviour Study

The students were introduced to the role that behaviour ecology played in wildlife conservation, and were guided to create their own animal behaviour study. They were encouraged to come up with their own research questions and to gather animal behaviour data in the parks using an ethogram.

3) Herpetofauna Survey

A nocturnal herpetofauna survey was organized to document the native wild herpetofauna that inhabit our parks. The students joined the survey as volunteers (see Picture 3 & 4 below), and learned about native wildlife and animal spotting techniques directly from wildlife experts from WRS and other organizations.



Conservation beyond the Zoo

To help the students think beyond conservation in zoos and aquariums, we facilitated discussions about contentious conservation-related topics. These discussions encouraged the students to discover their own worldviews, respect others', and to explore alternative solutions to environmental threats. Some topics of discussion were:

1) Decisions in wildlife conservation – What to conserve and how

Dovetailing the talk about the native freshwater crab, *Johora singaporenensis*, we facilitated a discussion about the merits and considerations of supporting its conservation. This discussion highlighted the decisions that conservationists need to make when selecting conservation targets.

2) Sustainable conservation

We encouraged the students to raise opinions on the best way to financially sustain conservation work. We then shared with them WRS' strategy as a self-funded wildlife institution.

Evaluation and Results

We evaluated the programme using written pre-post programme evaluation survey forms. These surveys were conducted both in 2014 (n=22 pre- and n=23 post-programme surveys) and 2015 (n=30 pre- and n=28 post-programme surveys). These surveys sought to find out if the students had changed:

1. Their perception towards the environment and conservation
2. Their perception towards the role of zoos in conservation
3. In their knowledge of native wildlife
4. In their awareness of conservation issues after completing the programme
5. In their likelihood to spread the conservation message to others

Our results show that the students were more concerned about ecosystems, particularly the interrelationships between species and their habitats, after the programme. Student perceptions of whether the loss of biodiversity would affect humans remained highly positive.

Post-programme, more students indicated that they felt zoos and aquariums played important roles in conservation.

Students were able to provide the names of native Singaporean species more accurately and specifically after the programme. The percentage of native animals correctly named rose from 40% to 89% in the post-survey. The species of animals named were also more specific e.g. "reticulated python" instead

of "snake"; *Johora singaporenensis* instead of crab.

The post-programme survey revealed an increase in understanding of various conservation issues after the programme (Table 1).

Table 1. Percentage of students who felt they understood the following conservation issues to a moderate to large extent pre and post survey.

	Pre %	Post %
Native wildlife and env. issues	11	88
Current conservation issues	16	88
Role of a zoo in conservation	20	96
Importance of conservation education	19	77

When asked to indicate whether they were more inclined to spread conservation messages to others after the programme, 92% of the students indicated in the affirmative to a moderate or large extent.

Discussion

One of the aims of this programme was to bring the participating students through a process of perspective-broadening and attitude change. It is heartening to learn from our survey that the students have realized that conservation encompasses whole ecosystems. Coming into the programme, the students had already grasped the concept that biodiversity loss can affect humans. However, it is unclear if this general concept was understood in detail by the students. According to Tan et al (1998), some Singaporean youth have a relatively high level of environmental knowledge, but they largely consisted of "learned responses" picked up from various environmental education sources. More specific questions about this concept can be put into future surveys to find out if this is indeed a "learned response" and if so, whether the programme clarifies these details for them.

The participants' knowledge of native wildlife increased quite noticeably after the programme. They were not only able to name specific species of native animals, but also indicated an increase in understanding of native wildlife conservation issues. In a free-response portion of the survey, some students indicated that their main takeaway from the programme was learning about endemic species in Singapore and how it was important to take care of them. This is a refreshing turnaround from Wee et al's (2006) findings that Singaporean youth tagged "values" to natural resources according to whether they can be used, not whether it was worth conserving. This view was in contrast to another student's intentions to "do something to help the biodiversity in Singapore", the benefits of which are so far-removed from the average Singaporean's daily life.

Student opinions of the role of zoos and aquariums in conservation also improved. Students recognized that wildlife institutions were important as breeding, research and educational facilities. In a free answer question, one student admitted to being "iffy (i.e. doubtful) about the concept of captive animals at first", but changed her mind after the programme. The students' also felt that their general understanding of wildlife conservation issues increased after the programme (Table 1). A belief that drives actions for conservation must be built on accurate scientific knowledge, and accompanied by a sense of moral responsibility. In future evaluations, it would be interesting to find out whether the programme affected the latter.

92% of the students said they were positively inclined to take action by telling others about conservation. Post-programme evaluations could find out if this inclination stretched to the extent of taking concrete actions e.g. start a campaign, or make tangible changes to their lifestyles, for the benefit of conservation.

It must be mentioned that the participating students were high-ability students of an elite Secondary school. The school's student exposure programmes are planned autonomously from the national Secondary school curriculum, and have a "strong bicultural emphasis" (Nanyang Girls' High School website). Based on their education, it is likely that the students possessed an unusually global outlook compared to students from mainstream schools. Leung et al (2015) found that more cosmopolitan-oriented individuals were more likely to have pro-environmental views, which could explain the students' already positive scores in the pre-survey, and their readiness to accept the values that were taught. The students had also chosen to attend the programme out of their own interests and were likely to already have a positive attitude towards animals at least.

Based on the results of our survey, the Future for Wildlife programme seemed to effectively engage youth in authentic, experience-based learning about wildlife conservation. More specific and meaningful evaluation questions or methods need to be employed in the future to accurately document its true impact. More importantly, an evaluation on the short-term (5 - 10 years) effects on the students' decision making and knowledge retention can tell us if the programme was truly an influential one.

Moving forward, we intend to continue to make this programme available to students from a range of educational backgrounds and academic interests, and to create a network of conservation-minded decision-makers and influencers of the future.

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Meet the Locals He Tuku Aroha - A case study on taking a collaborative approach to programme development

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Abstract

Meet the Locals He Tuku Aroha is Wellington Zoo's newest experience, and tells Wellington Zoo's love story to Aotearoa New Zealand. Through the development of thematic, holistic visitor programmes, Meet the Locals He Tuku Aroha provides meaningful learning experiences for all ages.

Visitor programmes were designed collaboratively, bringing together the Visitor Experience and Learning Teams, as well as a number of other specialists, and community stakeholders at key points during the planning process. This created high levels of engagement, and drove innovation and growth while developing both the space and the visitor programmes within.

Introduction

Meet the Locals He Tuku Aroha is Wellington Zoo's newest experience, and is Wellington Zoo's love story to Aotearoa New Zealand. The experience was designed to tell the stories of animals, people, and the land. Meet the Locals He Tuku Aroha is the realisation of our dream to become the best little zoo in the world, and it is proving to be a big hit with Zoo visitors, with research showing that some visitors are spending up to four hours at a time in the precinct, well above the norm for most of our exhibits.

A key strategic goal of the Zoo is to connect visitors with animals through the development of creative, meaningful, and holistic experiences. Spatial design, face to face visitor programmes, and interpretive media were developed side by side to ensure cohesive storytelling and messaging.

Meet the Locals He Tuku Aroha houses a variety of animals including Kororā little blue penguins, sheep, Kunekune pigs, bees, and grand and Otago skinks.

A Collaborative Approach, Programme Development

Visitor programmes were designed collaboratively, bringing together the Learning and Visitor Experience Teams, as well as a number of other specialists, including the Volunteer Manager, Conservation Manager, and Animal Care Teams at key points during the planning process. A collaborative approach ensured that the people delivering the programmes were engaged early on and had buy-in, ownership, and accountability for programming from the outset, which meant that the work was meaningful and relevant to them.



We also engaged with a variety of stakeholders, referred to as 'voices'. In addition to the Zoo's voice (conservation, sustainability, and animal welfare), and the animal voice (a celebration of behaviours and adaptations), there is the community voice (local farmers, South Coast residents, community gardeners, conservation groups etc.), the future voice (the voice of kids/future leaders) and the iwi voice (Taranaki Whaāui, a local Māori tribal group). These voices helped to inform and guide our decisions throughout the development, and helped to build a rich narrative for the space.

The voices were represented in many different ways, for example, the Zoo voice is represented in talks and messaging; the animal and community voices through interpretive media, for example the bee waggle dance interactive; the iwi voice through five pou korero (carvings); and the future voice through drawings and quotes from children incorporated into play areas, like on the walls of the giant penguin nest boxes.

There were ten stages in the development of programming: setting the scene (what, why, and how); task allocation; brainstorming; researching; programme design (using key criteria); testing; feedback and review; resourcing; sign-off; and training. The Learning and Visitor Experience Teams met for an hour every two weeks for six months in the lead-up to the opening of the precinct; these meetings were used to share and test ideas, and find solutions to problems.

Workshops were also set-up to further support staff learning, including a session with Australian interpretation practitioner, John Pastorelli, on having purposeful, message-driven interactions with visitors, and workshops with Taranaki Whānui representative, Neavin Broughton, on developing cultural competency.

Taking a collaborative approach to programme development gave us the opportunity to develop our staff- the next generation of leaders in our workplace and industry. Hart (2015) uses the term 'social collaboration' to describe the learning that takes place from working together, where the emphasis is on achieving business objectives. She states that the benefits of social collaboration for a team and an organisation are wide-ranging and significant. For us this included improved communication through faster access to information, improved insights into work status, problems and issues, and the opportunity for continuous learning and performance improvement.

Visitor Learning Experiences in Meet the Locals He Tuku Aroha

A challenge in developing the experience in Meet the Locals He Tuku Aroha was the limited number of animals in such a large space. Therefore the learning experiences developed and visitor contact have been vital for the space to achieve our learning, conservation, and community outcomes.

Over 20 new interactive programmes have been developed for the precinct, and the space is now a hub for school programmes, like Bush Builders, our community conservation programme, and Zoo Sleepovers. The programmes have been designed to be fun, meaningful and interactive, helping visitors to learn more about animals and develop an understanding of our reliance on nature, and how we can live a positive and sustainable co-existence with animals. The programmes are thematic and contextual, giving visitors a glimpse into the Zoo's conservation and animal care work, and an understanding of how they can take action, too.

Research has shown that 72% of zoo visitors arrive with the intention to learn something new (Roe &



McConney, 2014). We also know that many visitors visit zoos simply to enjoy a family day out (Dierking et al. 2002). With this in mind, we created visitor learning experiences that promote free-choice, family learning, where participants' curiosity and interest guide their learning, but it is influenced by the Zoo's perspective, where key messages are shared as people are immersed in the experience (Falk, 2005).

Programming was developed for each area based on the key message for that space. For example, in Penguin Point we highlight the work the Zoo does with Places for Penguins, creating safe habitats on Wellington's South Coast. Visitors can take part in our Nest Box Monitoring activity, to mimic the work we do monitoring boxes on the South Coast. They can learn about how important it is to keep dogs on a lead when walking them on the beaches where penguins live.

Another key component of programming was the use of contact animals, to give visitors the chance to meet and touch some of New Zealand's rarest and most iconic animals such as Tuatara, Forest Geckos and Wētā. Seeing, touching, or in the case of the Wētā, holding animals can create emotional moments for visitors. Research has shown that emotional experiences, like conquering your fear of holding a Wētā, for example, can result in long term learning (Falk & Gillespie, 2009). People will only protect what they value and research has shown that personal and emotional connections can facilitate a desire to engage in pro-environmental behaviours (Luebke et al., 2012).

Staff, Visitor, and Stakeholder Feedback

Staff involved in this collaboration were given the opportunity to provide feedback on the challenges, successes, and key learnings at both the planning and implementation stages of programming. This feedback was gathered via individual email evaluations.

When asked why they chose the particular area/programming element of Meet the Locals He Tuku

Aroha to develop, all staff indicated a passion for or connection to the animal or subject, for example, 'I love the idea of community gardens and encouraging younger people to join in and learn where their food actually comes from' and 'I chose the penguin area because I have always loved little blue penguins and feel a connection to them because I grew up living near wild little blue penguins.' Encouraging staff to develop programmes for the animals and subjects they were most interested in served as great motivator.

The thing staff enjoyed the most about the process was having the freedom to be creative, getting the time to research, and learning new skills. This feedback has been great for evaluating our success and has provided evidence that a collaborative approach to programming is worthwhile.

Our visitors have also provided feedback on the new space: "I love how the kids can get up and personal with the animals the last time we were there a zoo keeper let my 2 boys 2yr and 3yr feed the bunnies in their enclosure and they loved it!" Another visitor states, "I loved the links it makes really explicitly to the way the animals enhance our lives. I really enjoy the chance our children get to be respectfully up close to native NZ animals and to domestic animals they don't often encounter. It is a beautiful space to spend time in, really informative and gives a great hands on element."

Feedback from stakeholders has also been positive and our partnerships with them continue to grow. Meet the Locals He Tuku Aroha has been a fantastic platform to position the Zoo in the community as a social enterprise, working collaboratively to create community benefit.

Conclusion

Meet the Locals He Tuku Aroha, Wellington Zoo's love story to Aotearoa New Zealand, is providing fun, meaningful learning experiences for all ages. A big part of its success can be attributed to the collaborative approach we took to programme development. Research suggests that collaborative models of working can increase staff engagement and provide a context for continuous learning and performance improvement. Feedback from staff reflects these results, and every day we see our staff delivering programming with purpose, positivity, and pride.

Working with stakeholders to ensure their voice is accurately represented in the space means that Meet the Locals He Tuku Aroha really is a community hub. Our programming is helping visitors to connect with local animals and gain a better understanding of the living world, and their role in protecting it.

Acknowledgements

Thanks to the wonderful Wellington Zoo staff for their collaboration on this project, and those that contributed towards the 'five voices' represented in this precinct, including Taranaki Whānui, local farmers, South Coast residents, community gardeners, restoration projects, conservation groups, and local kids.

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Exploring our Interpretive Practice: An Impact Evaluation

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Abstract

Interpretation is a critical aspect of any zoo or aquarium's educational mission. This study evaluated the impact of Tiger Trail, a new habitat for Sumatran tigers at the San Diego Zoo Safari Park featuring an immersive environment where the visitor's journey unfolds through a storyline narrative. The study measured visitor knowledge of key messages, recall of interpretive elements, and reaction to the exhibit, and found that Tiger Trail visitors demonstrated significantly more knowledge of the exhibit's key messages relative to a matched comparison group. The study also found that visitors who interacted with an interpreter or keeper exhibited slightly more knowledge relative to exhibit visitors who did not, and that those visitors expressed significantly more positive ratings of the exhibit and their self-assessed learnings. There is increasing interest in measuring the results of interpretive efforts in zoological settings (Li, 2014; Falk, Reinhard, Vernon, Bronnenkant, Deans & Heimlich, 2007). The International Zoo Educators

Association (2015) states that "[e]valuation can be in many forms such as needs assessments or exhibition evaluations. It can also be used to gauge things such as the effectiveness of informal education or education techniques" (para. 1).

This article presents results from an impact evaluation of the Tiger Trail exhibit at the San Diego Zoo Safari Park. The study was commissioned to understand visitors' reactions to the exhibit and their activities within it, and investigated reception of key messaging. As interaction between visitors and zoo personnel has been established as a positive influence on visitor outcomes that include increased knowledge, conservation understanding and potential action (Anderson, Kelling, Pressley-Keough, Bloomsmith & Maple, 2003; Broad & Weiler, 1998), the study also compared outcomes between visitors who interacted with zoo personnel, and those who did not. The results of this evaluation were one important component that helped Tiger Trail receive the Association of Zoos & Aquarium's 2015 Top Honors Exhibit Award.



Defining the Interpretive Experience

Tiger Trail is the new habitat for Sumatran tigers (*Panthera tigris sumatrae*) and an immersive story-framed experience for guests at San Diego Zoo Safari Park. Opened in May of 2014, the exhibit focuses on the critical role predators play in any ecosystem, highlights the Sumatran tiger's endangered status, and presents multiple reasons for why the species is "on the edge" of extinction.

Initially, three key messages were developed to frame the interpretive experience:

1. Forests: Forests have amazing biodiversity
2. Predators: Predators are essential to the balance of any habitat
3. Conservation: Tiger populations have decreased to only 3,000 animals over the last 100 years; recent conservation efforts have helped prevent extinction

Secondary messages under each of the three areas further defined the information guests would receive

through the various interpretive elements. Systematic design ensured that each of the developed interpretive elements aligned with the key messages, and contributed to educating Tiger Trail visitors.

The Resulting Visitor Experience

The Tiger Trail narrative attempts to engage the visitor from the moment he or she steps foot into the exhibit.

- Emerging from a bamboo forest, visitors traverse trails to encounter a logging camp (*photo left*). This camp of felled trees is actually a play area for children designed to demonstrate and relate conservation messaging based on established research (Worch & Haney, 2011; Chermayoff, Blandford, & Losos, 2001).
- The Tiger Trail Pondok (*photo below*) represents a small market stand in which wildlife products, some from poaching, are sold. A conservation volunteer talks with visitors about the role of such markets and what can be done to prevent the illegal killing of tigers and other species.
- A log walkway allows visitors to view the tigers while receiving key messages from interpretive panels and volunteers.
- An interactive wall provides visitors with keeper-guided, close-up experiences with Sumatran tigers. At various times, keepers open the large glass panels and interact with the tigers through only wire mesh, and allow visitors to interact as well. Additional opportunities for interaction, like this tug of war game, are available (*photo at start of article*).
- The Sambutan Longhouse includes interpretive panels and shaded seating for extended viewing is available.

- The Waterfall Grotto offers more tiger viewing and interpretive panels that address diet and the Sumatran tiger's fight for survival (San Diego Zoo Safari Park, 2014).

Based on previous evaluation results (Marshall & Erickson, 2014), text panels are short and headlines convey key messages (*photo*). Artifact displays are used to capture the visitors' attention and reinforce how poaching for animal parts and deforestation impacts tiger populations. Throughout the exhibit, visitors may encounter interpreters (San Diego Zoo Global volunteers) and tiger keepers who share interpretive information.





Materials and Methods

The evaluation featured a quasi-experimental, post-only design with a combination “Key Message Assessment” (assessment) and visitor reaction survey. The survey contained 24 assessment questions (aligned to each of the defined key messages), three visitor reaction questions (exhibit rating, self-assessment of knowledge gained), and demographic questions.

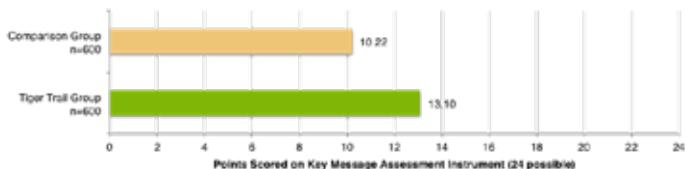
Over a five-day period during the 2014 summer season, an equal number of visitors were approached: (a) at the Safari Park entrance (the “comparison” group), and (b) following a viewing of the exhibit (the “Tiger Trail” group). Visitors were recruited with the purpose of balancing the two groups based on demographics of gender, age, and San Diego Zoo Global membership. Respondents completed the assessment/survey instrument using an iPad device. The final sample contained 600 individuals in each of the two groups (comparison, Tiger Trail visitors) that were statistically determined to be equivalent based on the demographic variables of interest.

Findings & Interpretation

Exhibit evaluation findings are presented in the following three key areas: (1) visitor recall of key messages; (2) impact of interpretive elements viewed and read; and (3) impact of interaction with interpreters and keepers.

1. Visitor Recall of Key Messages

Tiger Trail visitors demonstrated more knowledge of key message-related content and ideas than those who did not experience the exhibit. Figure below presents the average assessment scores between the two groups.



A t-test for independent groups proved the observed difference in scores between the two groups to be statistically significant ($p < .000$), suggesting essentially no possibility that observed differences are the result of random chance.

Chi-square analysis of responses on a question-by-question basis was used to investigate correct/incorrect response patterns.

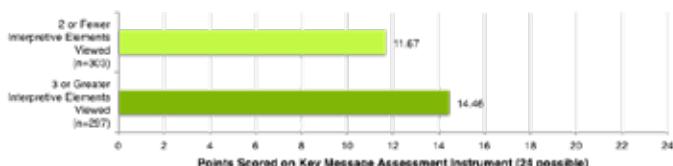
For all 24 questions covering the three key messages and 18 secondary messages, a greater percentage of Tiger Trail visitors provided correct answers relative to the comparison group, and all differences proved to be statistically significant ($p < .000$ to $p < .013$).

The greatest differences between the two groups were specific to knowledge about: (a) the Sumatran tiger’s distribution; (b) illegal logging giving way to palm oil plantations; (c) why tigers are illegally sold on the black market and what body parts are in demand; and (d) conservation actions visitors can take—specifically the use of sustainable palm oil and woods.

Given the positive and reliable difference in recall, relationships between assessment scores and exhibit elements were investigated next.

2. Impact of Interpretive Elements Viewed and Read

On average, Tiger Trail visitors indicated that they had viewed and/or read 2.48 of the 7 key exhibit interpretive elements. In this analysis, the Tiger Trail group was split into two sub-populations: (1) those who had viewed three or more interpretive elements (50.5%); and (2) those who had viewed two or fewer (49.5%). Figure below depicts the resulting difference in performance between the two groups.



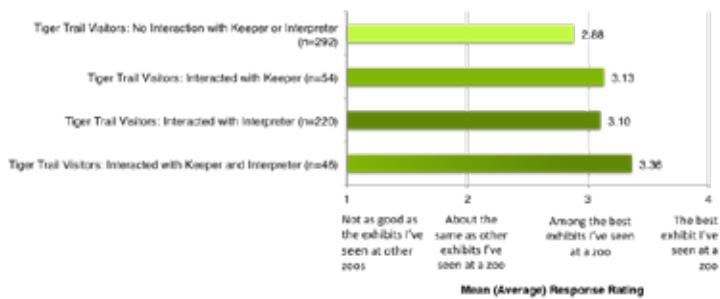
On average, Tiger Trail visitors who viewed/read at least three interpretive elements scored 2.79 points higher relative to those who viewed/read two or fewer. This difference proved statistically significant ($p = .000$).

Additional analysis of knowledge assessment scores by exhibit element demonstrated that, for the majority of exhibit elements, reading the interpretive panel text gave visitors an advantage on the assessment. This was especially true for visitors who had visited one or more of three interpretive-intensive key elements: the Pondok, Waterfall Grotto Area, and the Sambutan Longhouse. These visitors scored between 2.12 and 4.58 points higher relative to those who had not (all differences are statistically significant based on the t-test for independent groups procedure).

It should be noted that visitors are more likely to encounter an interpreter or keeper in these three areas.

3. Impact of Interaction with Interpreters & Keepers

Visitors who interacted with a keeper or interpreter had higher scores. However, these advantages were relatively small and did not prove statistically significant. An interesting trend was revealed in the visitor self-report survey data. For each of the three self-report questions, visitors who interacted with an interpreter and/or keeper indicated more positive perspectives about their visit experience. Figure below illustrates this trend through



visitor ratings of the overall Tiger Trail exhibit. Analysis of Variance (ANOVA) procedures indicated that ratings from visitors with no human interaction differed to a statistically significant degree when compared to those who interacted with an interpreter ($p < .008$), and those who interacted with an interpreter and a keeper ($p < .001$).

Additionally, these same visitors were more likely to indicate learning something new about tigers (statistically significant difference, based on Chi-square analysis) and about tiger conservation.

Conclusion

With statistically significant differences, study results favor the Tiger Trail group's performance across all key-message aligned questions. Further, there is a direct association between the number of exhibit elements read and viewed and the amount of key message-specific knowledge a visitor demonstrated following his or her Tiger Trail experience. Visitors also reported favorable overall ratings of their exhibit experiences, which are reliably higher for guests who interacted with a keeper or interpreter. Interestingly, guests who reported these interactions were more likely to indicate that they learned something new.

We conclude that the defined key messages delivered through a compelling storyline, diverse interpretive elements, and encounters with tigers, exhibit interpreters and keeper staff support reliable acquisition of targeted knowledge and concepts among Tiger Trail visitors.

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Application of Evaluation in Zoo Summer Camp Projects

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Abstract: Nanjing Hongshan Forest Zoo has successfully held “Zoo Quest” summer camp as a conservation education project for six years since 2009. This project is strictly designed according to the steps of ADDIE (Analysis - Design - Development - Implementation - Evaluation). Different evaluation methods and tools are used from start to finish depending on the project progress, which is optimized according to the evaluation in order to ensure project outcomes and effect. This article describes methods, tools and content of the evaluation, as well as data acquired in this process. Ultimately, the target is: Project participants grow empathy toward animals, and will lead an environmental-friendly life style in their daily life afterwards; they will also take some wildlife protection actions at their best efforts with a respective attitude to nature.

As a developed city in the middle and lower reaches of the Yangtze River, Nanjing has 1,489 primary schools, with about 400,000 pupils. Nanjing Hongshan Forest Zoo is the only organization that has launched summer camps, which conduct publicity and education of environmental protection with animals as the starting point. Therefore, it has a broad market. We carry out “Zoo Quest” summer camp conservation education project, which aims to make the campers; through personal involvement and experience, a series of classroom education, as well as interactive games; provoke thinking, inspire empathy^[1] and love, thereby enhancing their awareness of nature, conserving ecology and respecting life. During the participation process, campers will learn about animals, and understand the importance of protecting animals and the ecological environment. Ultimately, the project participants will lead an environmental-friendly life style in their daily life afterwards. They will also take some wildlife protection actions at their best efforts with a respectful attitude to nature.

The summer camp project is designed according to the steps of ADDIE - Analysis - Design - Development - Implementation - Evaluation^[2]. Different evaluation methods and tools are used through from the beginning to the end depending on the project progress. The project is modified and optimized according to the evaluation results in order to ensure project outcomes and effect. Considering that the campers enrolled for summer camp projects are between 8 and 12 years old, we use questionnaires designed to the needs of the target audience, guide and design projects in which they have a strong interest, and undertake timely assessment and project content revisions.

Application of evaluation in the design and implementation of the “Zoo Quest” summer camp project

1.1 General conditions of the “Zoo Quest” summer camp project. Designed as a public ‘welfare’ project, with some charges to assist maintaining its normal operation, the summer camp project has been held 24 times, and 725 campers have been recruited from 2009 to 2014. Table 1 shows the statistics of class number of summer camps by year, and charge details. (100 Yuan = approx 15 US dollars)

1.2 Application of evaluation during the preliminary design of project. There were a total of 117 people who participated in the survey during the early stage of the project design. Table 2 illustrates the target and demand of the participating campers. We design our activities according to their needs and demands.

Table 1 Statistics of class number of summer camp, number of campers and charge details

Year	Camp duration	No. people	Charge: (Yuan/person)
2009	3 days & 2 nights (three summer camp terms)	76	380
2010	3 days & 2 nights (three summer camp terms)	97	480
2011	3 days & 2 nights (three summer camp terms)	102	680
2012	2 days & 1 night (four summer camp terms) 5 days & 4 nights (one summer camp term)	114	380 1180
2013	3 days & 2 nights (five summer camp terms)	146	780
2014	3 days & 2 nights (five summer camp terms)	175	880

Target and demand of the participating campers	No. people	%
Learn knowledge about animals	73	57.0
Learn animals' life and mystery	80	62.5
Make new friends and enjoy happy time together	55	43.0
Cultivate own ability to live independently	62	48.4

Table 2: Statistics of the target and demand of the campers in the summer camp projects

As seen in Table 2, their needs mainly focus on four aspects, i.e., learning, entertainment, making friends and physical exercise. Their needs for all the aspects are approximately equal. We take into consideration all those aspects and aim to fully satisfy their needs in the project design. During project design, we give sufficient consideration to the psychological characteristics of adolescents and children --they have strong curiosity and thirst for knowledge, and they like practicing by themselves (DIY), etc.. We adopt multi-sensory participation^[3].

The final scheme mainly includes three parts:

(i) Visits to home of wild animals: understand the little-known story behind animals, to establish empathy; visit the feeding area and nursery rooms for animals, to learn health and happiness of animals, as well as the busy lives and feelings of conservationists.

(ii) Exploration into Nature: Activities, like outdoor exploration, creation of nature, game of environment protection, as well as bird watching^[4], allow the members to understand close relations between humans and nature during the process of discovery and thinking.

(iii) Exploration at night: Observing animal behaviors at night, walking in a mysterious and peaceful night and going through a dreamlike firefly valley, participants can obtain a beautiful experience.

Each of the three parts cover the above-mentioned four aspects, but have a different focus, such as "Exploration of Nature" project. The campers help and cooperate with each other and play together in outdoor activities, which gives them a chance to make friends, to promote their social skills, and to enhance their abilities coping with natural environment, and these are our main targets; at the same time, they will learn the mystery of animals, learn knowledge about nature and animals, and establish emotional connections with nature.

Project		Initial project contents	Revised project contents	Re-revised project contents
Visits to panda pavilion	Method	Listen to instruction and lecture, conduct hands-on practice, and make panda with clay	Listen to instruction and lecture, and drawing panda	Listen to instruction and lecture, and paint panda on a hand fan
	Evaluation	42% completed, handicrafts, too difficult	61% completed, draw picture as a memento	93% completed, the work can be used as souvenirs
Bird appreciation	Method	9:00-10:00 am, appreciate birds	8:00-9:00 am, appreciate birds	5:30-6:30 pm, appreciate birds
	Evaluation	90% recognized 4 kinds of birds, the environment is too complex	90% recognized 10 kinds of birds, environment is improved	95% recognized over 14 kinds of birds, environment is quiet
"Vanishing Wetlands"	Method	Space squeeze on wetlands	Space squeeze on wetlands. tracking by phone	
	Evaluation	96% campers take food in proper amount	95% has no wastes as per telephone survey one week later	
"Birds looking for worms"	Method	Look for worms on grassland, stick them to the KT board, and find the law	Each group looks for worms of different colors	
	Evaluation	Failure	100% of the campers find out the law in the project	
Logistics - Accommodation	Method	All 3 days in camp for the summer camp	1 day in camp plus 2 days in hotel for the summer camp	All 3 days in hotel for the summer camp
	Evaluation	10% satisfied, 32% common, 58% dissatisfied	67% dislike camping, 83% like hotels	92% and above satisfied
Logistics - Diet	Method	Breakfast: Traditional Chinese; lunch and dinner: snack	Breakfast: KFC; lunch and dinner: at Central Square	
	Evaluation	Snack is single in type, 60% are not satisfied	81% satisfied	

Table 3 Case comparison of improvement effects in the application of evaluation method in summer camp projects

1.3 Application of evaluation during the project implementation stage

The summer camp project is composed of a number of sub-projects during the implementation stage. We undertake a corresponding evaluation for each sub-project, and modify the content according to the cause analysis on the evaluation results. Then, we reassess the effect of such modification in the next summer camp project. We even repeat the process of modification and evaluation for a part of a sub-project 2 or 3 times until getting desired results. Table 3 is a case comparison of improvement effects in the application of evaluation method in summer camp projects.

Table 3 shows that these sub-projects can get a good effect through evaluation, analysis on causes and improvement in design. We hoped that the campers would know the appearance, color and other basic biological characteristics of pandas by listening to instruction and lecture during visiting the panda house, and to test themselves by participating in the hands-on practice. The hands-on practice was composed of three small activities, i.e. "making panda with clay", "drawing panda", and "painting panda on a hand fan". We paid attention to arousing their interests, which received a good result, and the completion rate was increased to 93% from 42%. During painting pandas on a hand fan, 32% of campers created a good background for the picture, such as bamboo forest, which exceeded our expectations.

We found the design flaws through project evaluation during the bird appreciation project. Then, we adjusted the bird watching time to achieve a good result.

We hoped the campers would learn some biological characteristics about camouflage of the insect in the project of "birds looking for worms". The objective of our first design for the game was to help our campers find out that they can find few worms with camouflage. However, the campers could find worms with a variety of colors, and they failed to notice camouflage. Then, we adjusted the determination of single objective for each group. As a result, our campers found out pattern and rule, and realized the importance of camouflage for worms in nature.

The accommodation and meals play an important role in providing a good summer camp experience, and the campers can focus on learning and entertainment only if their basic needs are guaranteed. Therefore, we have made evaluation for the logistic work and made some improvements, which received a good result (Table 3).

2 The evaluation method for the summer camp project and its application

Project Contents	Evaluation Basis	Completion Results (%)
Making steamed corn bread for kangaroos	The completion progress of the nutritional steamed corn bread	95
Observation of the animal behavior	Distinguish wreathed hornbill and great hornbill	96
Looking for primates within a limited time	Puzzle competition in relation to biological characteristics of animals	85
Ground star - firefly	Looking for fireflies without capture	99

Table 4 Evaluation and result of the behavior of the campers

2.1 The method of evaluation by observing the behavior of the campers In addition to teacher-directed lecture in the summer camp project, there are many participant activities, and we can assess the learning effect of the campers and the design and implementation effect of the project by observing the performance and behavior of the campers during the activities. Table 4 shows the method of evaluation by observing the behavior of the campers and the evaluation result during the summer camp project.

After visiting animal kitchens (food stores/prep areas), the campers learned the classification of wild animals according to their diets, they knew different animals have different diets and the zoo has provided rich food for them; in the end, they made steamed corn bread by hand for kangaroos. 95% of the campers knew the formula of animal food in the process of making diets, and knew why we cannot feed the animals randomly in the zoo.

We observed the animal behavior in the hornbill house [5] and taught campers how to distinguish wreathed hornbill and great hornbill, let campers know such birds' social behavior and the effort made by animal keeper in animal protection. The campers showed empathy to hornbills, and 96% of the campers completed the task of this project. Such evaluation method was also adopted in the project of "looking for primates within a limited time" and "ground star - firefly", which received a good result.

2.2 The method of evaluation by observing the language expression of the campers. We provided many opportunities for oral expression for campers in the summer camp project by inviting them to describe their opinions and the like. Then, we can know the effect of the project and the situation of mastering relevant knowledge via observing the integrity of the

Project Contents	Evaluation Basis	Completion Results (%)	
Vigorous and colorful life	Video interviews	90	We design evaluation methods for different target groups, and our evaluation methods are flexible by combining knowledge and interest, which is more likely to be accepted.
Environmental protection scene drama	The scene drama written, directed and acted by campers	90	Even if the evaluation result is satisfactory, we still should pay attention to appropriately guiding and conducting the project in line with the theme of conservation education. For example, the blowpipe injector (dart system) had been very popular among veterinarians before 2012. However, such injection method is inconsistent with the concept of conservation education, because it is possible for the animals to cooperatively complete some medical examination and treatment after scientific and rational behavior training. As a result, such method is not used any more.
Review and Summary	Express your feelings	Collect various suggestions and proposals	We can use one or more evaluation methods, separately or simultaneously as needed, in practice, and we will adjust related design according to the evaluation results in time, to achieve the maximum effect of the evaluation, and the evaluation result may vary with time.

Table 5 Evaluation and result of the behavior of the campers

content expressed by them. Table 5 shows the method of evaluation by observing the language expression of the campers and the evaluation result during the summer camp project

In “vigorous and colorful life” class, the teacher taught campers about biological diversity, so that the campers knew the meaning of biological diversity and its relation to our basic necessities of life (food, clothing, housing, and movement), which aroused them to show gratitude and respect to the nature^[6]. After class, we invited campers to express their feelings and opinions via video interviews, and 90% of campers said that they would protect biological diversity and protect the nature in various ways.

On the third afternoon, we divided campers into groups, and each group of campers performed an environmental protection scene drama. Such scene dramas were written, directed and acted by campers themselves, 90% of the campers can capture the subject matter by beginning with a knowledge point.

We share a “communication moment” at the end of each summer camp project, in which campers can talk about their experience and express their feelings, and they also can put forward opinions and suggestions for our project. Then, we make modification to our scheme according to their opinions and suggestions, and make improvements in the next summer camp project.

We also use some commonly used evaluation methods in the project, such as questionnaire, data statistics, and call back^[7].

3. Discussion

By adopting appropriate evaluation methods, we can make a scientific analysis and summary of the effect of the activities or events; furthermore, it can enable the achievement of the goal. For example, we can conduct a comprehensive evaluation for the effect of the conservation education project based on the environmental protection scene drama written, directed and acted by campers themselves. 90% of the campers can capture the subject matter by beginning with a knowledge point.

Acknowledgements: This study was supported by Teacher Yu Zeying from Chinese Association of Zoological Gardens during compilation. We would like to express our heartfelt thanks to her for systematic guidance and detailed modification.

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EAZA Campaigns as a tool for securing funding

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European Association of Zoos & Aquaria [EAZA] campaigns have been run at our zoo since 2007 aiming at direct support to certain species or regions, increasing the visitor's knowledge about special problems or providing tools for raising awareness, and/or funds for certain conservation issues.

The first campaign was pretty simple to run with a number of flagship species, which were appealing and commonly exhibited in zoos. Gradually they have become more difficult, addressing a wider spectrum of subjects. All campaigns required hard work educating staff and significant fund raising. Although we usually have been able to secure limited funds from external sources (local and district conservation funds) for printing materials and educational panels, it became clear that with the "Pole to Pole" campaign 2014-15, there was a much greater potential. At the same time, there was an open competition for funding of conservation education activities, including global climate change issues, through so called "Norway grants" or European Economic Area [EEA] grants. These funds comprise money contributed by Norway, Iceland and Lichtenstein, which are countries that benefit from free trade with the European Union [EU], but not formally belonging to this organization, accessible to EU members.

We have decided to make something more permanent, like a special education pavilion addressing global climate change. The goal was to have a long-term facility that in the future may serve other activities as well (the beneficiary of funds is obliged to run the project for 5 years).

The work began with planning the facility and displays as well as the budget. Then the project was sent to the responsible agency for funds, and all went quiet... Suddenly, after a few months a letter arrived, saying that we were granted the funding, covering 85% of total cost, that is around 700,000 EUR. Due to lengthy administrative procedures the actual time for actions, including construction, was extremely short (although we could re-negotiate some delays). The actual construction began in September (some of the participants at that year's EAZA conference which was hosted at Wroclaw, probably noticed a small hole in the ground near the main entrance to the zoo) and concluded with official opening on the 18th of December 2015.

So, what exactly is the new facility? What are our hopes and obligations associated with it, and what activities are sponsored?





The “Climate, animals & people” Pavilion is the first exhibit in our zoo that doesn’t accommodate any live animals. In turn, there is a load of multimedia which encourages visitors to explore. It has 13 stations delivering information on global climate change. The aim is to address adults as well as children, and convince people that “small steps” in everyday life make “big difference” globally.

The idea of a brand new form of education was created by the Marketing and Education Team. One idea led to another and so we ended up with a huge challenge, something we’ve never done before. We are aiming to host at least 100,000 visitors in the pavilion (by the time this article is being written it’s already 30,000 and counting fast) that’s the rate established in the project.

People are short-sighted about the future. We want to widen their horizons, making them care about our home – the Earth. It is much easier to convince children, but hopefully adults will also be inspired to change their habits in a positive way. The pavilion educates the visitors about climate change and doubles as a classroom for our seminars.

Each day, Monday through Friday we conduct courses for children aged 5+. We plan to educate 20,000 pupils a year, having done 19,000 already. In addition to one hour lessons, the pupils receive a rich info pack containing materials such as booklets, leaflets, worksheets, postcards and posters— all created by the Marketing and Education Section; and printed thanks to the funding.

As you leave the Pavilion, you may notice a group of colorful penguins – they all are the actual size of the emperor penguin, the largest of all penguin species and one of the ambassadors of the Campaign. The figures were painted during events at schools and shopping centers. There is also a permanent educational exposition about the Project. Thus we’ve reached out to the wider public—not only the zoo visitors, but virtually all city dwellers and more, as the news spread across the internet and social media.

We hope this story shows that EAZA conservation campaigns are an important platform for a deeper engagement in environmental education, potential additional funding source and not necessarily just a financial burden put on zoos. Surely the fact that the money is being earmarked for Europe-wide campaign, helped the funders to make a positive decision for our project.

Special thanks are due to our education crew, especially Anna Mielnikiewicz, Katarzyna Mielecka, Monika Kownacka, Joanna Kij and the project coordinator Katarzyna Hetmaniuk for working hard under enormous time pressure.



Biodiversity Is Us: International Education Campaign At The Buenos Aires Zoo

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Abstract

During 2015, the Zoological Garden of the City of Buenos Aires held the International Education Campaign "Biodiversity Is Us", created by the World Association of Zoos and Aquariums (WAZA), and aligned with the objectives of the International Zoo Educators Association (IZE).

The activities were mainly aimed at visitors (children, young people and adults) and the children participants of the non formal education program of the Zoo.

Introduction

Today the term biodiversity has taken great importance in various areas and fields of science as well in political, economic and social fields. Biodiversity or biological diversity is defined as the variety of life that exists on the planet. This concept is sufficiently comprehensive to include all levels of biological organization. The most widespread definition is included in the Convention on Biological Diversity and defines it as "the variability among living organisms from all sources including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (CBD, 2001-2005)¹. Glowka et al., (1996)² clarifies that it is not simply the sum of all ecosystems, species and genetic material. On the contrary, it represents the variability within and between them. This is why biodiversity is important not only for ecosystems, but for the human being, as it provides us with food, fuel, the regulation pests and diseases, it processes and assimilates waste, as well as regulates floods and weather, among other things. Unfortunately biodiversity is gradually shrinking at all levels and this threatens our planet and the life that inhabits it. Currently, the main threats that have been identified to biodiversity are: the reduction, deterioration and fragmentation of habitats, excessive use of resources and overexploitation, the introduction of invasive species, the pollution of bodies of water and soil, and climate change. It is for these reasons that the conservation and preservation of biodiversity depends on everyone of us.

The objectives of the Zoological Garden of the City of Buenos Aires includes presenting the different species that live in Argentina and the various environmental problems that threaten wild populations and, in that way, being able to promote the search for practical solutions to help mitigate or reduce the threats that affect these species directly or indirectly. At the same

time, working together with other institutions at either national and/or international levels is proposed, after joining efforts in the diffusion of those environmental problems that affect biodiversity (including species and ecosystems). That is why the Zoo joined the 'Biodiversity Is Us' WAZA campaign run in partnership with the International Zoos Educators Association (IZE).

According to WAZA (2015)³:

Through the discovery of fascinating species data and the interest of visitors, who will join actively in a community willing to make a number of positive changes in the environment will wake up. By performing each and every one of these simple daily activities, we can make a major contribution. "Biodiversity is declining rapidly, but the situation could completely change with the participation of all."

Our target with Biodiversity Is Us is to show people the urgent need for action and ways to do so. Besides being fun and rewarding, many of the actions we are proposing will help us lead a healthier life.

Content

From the material produced by WAZA for its campaign, the Department of Environmental Education developed another specific and material was designed for activities and events in relation with this theme. This material used to promotion, education and recreation, contains information about the campaign and points to work in every event. In addition, several other actions were included where some people could discover how they can contribute to the care of environment and the local and world biodiversity.

To achieve our commitment to the campaign, a series of actions were undertaken in the various educational proposals of the Institutional Educational Project of the Zoological Garden of the City of Buenos Aires that took place during 2015.

In each activity participants who agreed to take part in were evaluated. In some cases evaluations were



developed before the activity to understand the prior knowledge of the participants about the proposed framework and in other cases they were performed before and after the activity. The analysis of all the data collected is under process.

The development of activities in picture

1. Little Nature Keepers

Educational proposal of annual duration aimed to children with ages between 6 to 12 years old, presented at monthly modules.

2. Commemorative Dates: World Environment Day (WED)⁴

Educational daylong public event aimed at children aged between 2 and 15 years old.

3. National Children's Art Competition

Promotes free drawing to children between 3 and 13 years old. The paintings were received between March and October. The topic for the year 2015 coincided with the campaign "Yungas: Jungles of the Mountain. Among Everyone we Protect their species".

4. Graphic and sculptural sketches's contest

It promotes the elaboration of graphic and sculptural sketches to children (over 8 years old), teens and adults. The theme for the year 2015 in line with the campaign was "BIOdiversity in art". The Sculpture Museum Luis Perlotti participated in the performance of this contest (<http://www.buenosaires.gob.ar/museoluisperlotti>).



5. Environmental Education Zoo Course

Two class topics were chosen from the course "Biomes of the World and Eco-Regions of Argentina" and "Ecology and Conservation of the Biodiversity" which had a direct relationship with the theme of the campaign to complete a training method that differs from the one being done each year.

Total Number of Participants: 943. (children and adults)





Conclusion

The material provided by WAZA led the approach to a basic idea on which the material generated by the Environmental Education Department was adjusted. It was not possible to apply the audiovisual material to the local context. As a result, printed material with educational texts were utilized.

This was the first year in which the use of evaluations to participants was implemented, to both children and adults. In addition to obtaining valuable quantitative research information, an exhaustive investigation was made about the prior knowledge of the public visiting the Zoo of Buenos Aires on the topics being addressed. In Little Nature Keepers pre and post assessments were performed hoping to clarify whether or not there were "immediate" conceptual changes in the children after participating in the activities.

The implementation of this campaign has allowed us to strengthen each of the activities that are performed every year in the Zoo in terms of theoretical content, development of educational materials and logistics of each activity, in which staff from other areas of the park are actively involved in. Detailed records of the number of participants, by activity and age ranges were gathered. This is essential data to share and compare experiences at the both the local and international level.

Such initiatives promote the implementation of similar ideas in different parts of the world, adapting them to the context and characteristics of their communities. The evaluations, criteria, strengths and weaknesses will also differ by region. So will the impact of these actions, and the intensity they may have. On the other hand, the exchange of this information may enable the development of new and revolutionary strategies.

Acknowledgements

We want to thank Stella Maris Velazquez, the coordinator of the activities at the Zoo that were crucial for this campaign, and all the environmental educators that were involved in them.

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Can exhibits transform the adult visitor into the adult learner?

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Introduction

It is becoming increasingly recognized that cultural attractions are unique locations for place-based learning to occur. Clayton, Fraser, & Saunders (2009) highlight zoos in particular are widely being accepted as 'educational resource' with support from emerging research. However, most of the research on the effectiveness of educational approaches in informal learning has been largely focused on children, or parent-child interactions (e.g. Leighty & Mellen, 2012).

To begin engaging the adult visitor, zoos must approach the adult zoo visitor as an adult learner. There are many studies that support the practice of andragogy, the study of adult learning theory and corresponding instructional approaches, and describe how this differs from that of pedagogy, or a traditional child-centered learning theory. Knowles' (1980) andragogical model incorporates several assumptions about the adult learner. The foremost assumption is that learners move away from being learners dependent on external motivation toward an internal motivation for learning. This self-directed learning is described as: the individual as the primary source for preparation, execution, and evaluation of their own learning (Knowles, 1990).

The learning that occurs in zoos is directly impacted by the combination of elements within the environment, both the elements that naturally spark visitor curiosity and those elements added by institution by design. This combination of elements may include animals, individual displays, immersive exhibit qualities, and educational elements. All of these elements create a learning environment that facilitates learning, which occurs at the visitors' own rate and as a result of their own decision and motivation (Bell, Lewenstein, Shouse, & Feder, 2009).

Many zoos and aquariums are implementing new strategies regarding message content and how they engage their audience (Fraser, Bicknell, Sickler, & Taylor, 2009). Zoo professionals have to decipher between what is perceived as entertainment, sensational, or informative by the guest. Designers must consider the exact message they want the guest to walk away understanding and how the interpretive plan meets this objective while enhancing the guest experience.

While there is limited research on how educational media influences adult visitors in zoos, there is much research on effective placement and labeling

of elements as well as the interpretive approaches in cultural attractions, such as national parks, museums, and other similar destinations (Fraser, Bicknell, Sickler, Taylor 2009; Street, Jenkins, Fasier 2012; Weiler, & Smith, 2009). Media may include static signage, audio presentations, moving visual images, or a combination of both audio and visual packages.

Despite their continuous incorporation into zoo exhibits, many zoo professionals believe the visitor ignores these educational elements. Visitors have self-reported their preferred activities to do while at the zoo and note they spend significantly more time looking at animals than the signage; in fact, reading educational media ranked 10th out of the 12 potential activities in which a zoo visitor might do during a visit (Yocco, Heimlich, Myers, & Jenike, 2010). Francis, Esson, & Moss (2007) observed visitor behavior at Chester Zoo and reported that a visitor to the zoo's newest exhibit commonly spent only 19% of the total time in an exhibit area interacting with educational media. At the Cleveland Metroparks Zoo, Clayton et al. (2009) found that only 27% of visitors engage with educational media. In a study conducted by Monash University, researchers found no specific form of interpretive media is more successful than others at transmitting information; rather, it is the amount of elements and how messaging is layered, or repeated. This layering of interpretative media appears to impact cognitive, affective, and behavioral outcomes (Weiler & Smith, 2009).

This evaluation study was completed for Omaha's Henry Doorly Zoo & Aquarium focusing on the effectiveness of the newly installed interpretive elements at creating knowledge transfer in adult visitors visiting the aquarium exhibit. This exhibit features modern elements, including the use of movies, audio, static graphics on a screen, and permanent static graphics.

Methods

This study utilized a participant-oriented evaluation model. Data was collected over a course of eight consecutive days during regular operating hours. Participants were recruited during their visit prior to entering the Aquarium. A total of 134 participants over the age of 18 fully participated in the study.

Participants were placed equally into one of two conditions: one that completed a pre- and post-assessment and one that only completed an assessment at the conclusion of their visit. Post- assessment group served as a quasi-control group, while the pre- and post- assessments functioned as the experimental

group. The pre-assessment was designed to establish a baseline in the experimental group. Each assessment contained the same questions, which focused on information presented by the interpretive elements. The initial assessment was completed before entering into the exhibit and consisted of a pre-test and the development of a Personal Meaning Map (PMM). Upon exiting the exhibit area, participants completed a post-test and were allowed to revise their PMM.

Chi-square tests of independence were performed to determine whether the likelihood of engaging with interpretive elements was associated with educational background or frequency of visiting the zoo. Paired Sample T-Tests were used for measuring change in scores between pre- and post- assessments.

Results

Participants were asked to self-report their preferred learning style; results included listening (5%), watching (43%), and doing/participating (51%). 68% of participants stated they encountered media that matched their preferred learning style. The most popular responses regarding preferred ways to learn about animals while visiting a zoo included: interacting with a live person (43%), learning by doing something (28%), and viewing educational signage (11%) and videos (15%). One participant stated, “not enough hands-on or interactive learning...would have enjoyed a ‘what you can do’ station.” 93% of visitors believed the exhibit was a positive learning experience and 79% stated they learned something new from visiting the exhibit.

Participants were asked to respond to statements regarding their opinion on educational media using a scale of 1-4, with Not Important = 1 and Essential = 4. Responses are listed in Table 1. 40% reported that the corresponding animal attracted them to interpretative elements.

“I believe educational materials in zoo exhibits...”

...should be placed away from an animal / display	1.32 (SD=0.62)
...should be included	3.47 (SD=0.60)
...should be placed near an animal / display	3.38 (SD=0.72)
...should be interactive	2.66 (SD=0.85)
...should be colorful	2.72 (SD=0.78)
...should incorporate technology	2.25 (SD=0.87)
...should be large	2.27 (SD=0.84)

The increased presence of words matching key words in planned educational themes from the media on the PMM was significant; $t(67)=-3.01$, $p<0.05$. However, the number of words added to the PMM during revision was not significant, $t(138)=-1.569$, $p>0.05$. The average number of science-based words in the initial PMM of

Response category	Actual response examples
Science-based Verbiage	Migrations, Currents, Symbiosis, Predators
Emotion-based Verbiage	Peaceful, Powerful, Adventure
Descriptor / Imagery	Salty, Mysterious, Unending, Vast
Pop-Culture References	Moby Dick, Finding Nemo, Blackfish
Appreciation/ Respect	Self-Reliant, Irreplaceable, Beautiful
Negative Verbiage/Descriptors	Scary, Uncontrollable, Dangerous
Human-Use	Ships, Swim, Surfing, Fishing/seafood, Navy

Table 2. Categories and typical responses for PMM Prompt, “Oceans.”

the pre/post assessment group was significantly lower than those in the post-only assessment group; $t(58)=-2.15$, $p<0.05$.

8% of participants provided a word/phrase that described a conservation related topic, with 18% of these words/phrases being action-based. 12% of participants changed wording during the revision phase to reflect a change of attitude towards oceans (example: crossed out ‘scary’ and replaced with ‘bountiful’). Table 2 provides examples of responses.

Conclusion

This study found that interpretive media are actively utilized by adult visitors on a limited basis. Echoing the findings from the study completed by Weiler & Smith (2009), it was found the repeated layering of stimulating visual and audio effectively transmitted information for retention, including an understanding of conservation and action that can be performed by the visitor. In addition, motivations for learning, such as curiosity, and the methods of preferred learning, such as participating in a task, were revealed. Static graphics were sporadically viewed by the visitors and were sought out to answer an immediate question, typically due to curiosity stemming from an observation of an animal or habitat. The elements that were most effective at transmitting information were movies with corresponding audio.

The learning environment, and the learning content, is different from traditional forms. External factors that are not intended, such as social dynamics, crowds, and interests are often not accounted for in interpretative planning; therefore, facilities potentially miss valuable contact time with individual guests. Conflicts to the learning process, including social dynamics and desire for entertainment, may not be conducive to active learning. In this instance, the animals and displays serve as an important catalyst in igniting a desire to learn in the adult zoo visitor.

In order to increase the effectiveness of the elements, information should be presented in a manner that is repeated and presented in differing forms. For example, effectiveness can be increased through the employment of multiple forms of media, within a given space, to convey important themes. Mayer (2010) provides additional support by stating that individuals will retain more information at a higher rate when the multimedia source provides audio instead of visual only information; for example, spoken language accompanying an animation or image instead of captions over the image.

Effectiveness of educational elements is determined not only by intentional design and content of the element, but also the relationship of placement to animal enclosures. Altman (1998) notes that observed animated activity in animals by zoo visitors elicits attention to the animal's action, and this in turn facilitates visitor learning. As found in this study, adult learners prefer information that is readily available and accessible at the time of questioning. The combination of educational and interpretative elements can increase the likelihood of zoo visitors learning information regarding conservation and scientific information. All incorporated elements within the exhibit space help facilitate learning, which occurs at the visitors' own rate and as a result of their own decision and desire to learn (Bell et al., 2009).

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Investigating factors which affect visitor understanding of the information displayed on species signs: a multi-method evaluation approach

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Introduction

One of the key educational roles of modern zoos is to communicate important messages about the conservation of biodiversity and to engage with individuals and with society to elicit positive action for nature (Zimmermann et al, 2007). This case study presents an example of how the Isle of Wight Zoo in the UK has evaluated one type of interpretation: printed species information signs that use text to convey information about animals and the conservation issues that they face to zoo visitors.

Research questions

The zoo's species signage had been in place for several years and replacement signage was planned. An evaluation investigating how effective the existing signs were in communicating information to visitors was carried out to inform the design of the new signage. The study was later repeated to evaluate the impact of the new signs. The study aimed to answer two research questions:

Do visitors understand the information on the species signs? What factors affect visitor understanding of the information displayed on the species signs?

A multi-method approach

Data was collected in three ways: in-depth interviews with visitors to probe their understanding of the information and to collect their opinions about the layout and content of the signs; direct observations of visitor interactions with the signs to find out if those visitors actually stop to read them; and a documentary analysis of the text in the signs to find out how easy or difficult they are to read.

Figure 1 (right) - The old-style signs, showing how information was arranged.

Method: Documentary analysis

The signs were analysed for legibility and for readability. Legibility is generally accepted to be measurable by the speed and the distance at which text can be read (Webster and Tinker, 1935). Elements that have been shown to influence legibility are font size, type face, and colour of text and background (Webster and Tinker, 1935), (Serrell, 1996), (Moriarty and Scheiner 1984), (de Lange, Esterhuizen and Beatty 1993). These were assessed qualitatively and visitors were questioned about the legibility of the signs.

A quantitative readability assessment of the signs' text was carried out using the Flesch-Kincaid Grade Level Readability Formula. This method is included as an automated option in Microsoft Word. The validity of the scores was checked by testing three randomly-selected samples of text using another commonly-used readability testing method: the Fry Graph Readability Formula (Fry 1977, cited in Harrison 1980).

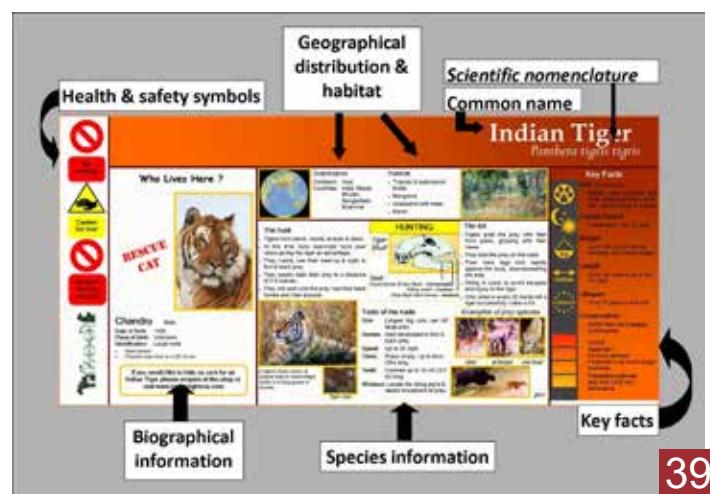
A qualitative analysis of sentence structure was undertaken in order to gain a clearer picture of syntactic complexity that might not be apparent from the readability tests. A word count of each sign was also made. The text was analysed for specialist vocabulary relating to the biology or ecology of the animals and for the presence or absence of definitions or explanations for those terms identified.

Direct structured observations

To find out the proportion of visitors that read the signs, how long they read them for and whether or not they discuss the content with others in their group, direct structured observations were carried out from a discrete distance. Observations were carried out in blocks of one hour and were timed so as to avoid coinciding with public presentations such as feeding times.

Visitor interviews

Randomly-selected participants (n=10) were each asked questions about the content and design of the species information signs. Participants were encouraged to expand on their answers and to make additional comments in order for the researcher to gain maximum insight. Interviews were audio-recorded, leaving the tape running for a short period afterwards in case the participant made



any additional relevant spontaneous comments. Once all the interviews had been transcribed they were read and re-read to allow themes to emerge from the data using a content analysis approach (Dawson 2009). Sample size was small because each interview yielded much data and time available for analysis was limited.

Results

The mean number of words on the signs was 411. Depending on reading speed, this quantity of text would take between 75 and 120 seconds to read in full (Rayner, Slattery and Bélanger, 2010).

Documentary analysis and interview comments indicated that legibility was good. The results using the Flesch-Kincaid Grade Level Readability Formula ranged from reading age 9.0 to reading age 14.2.

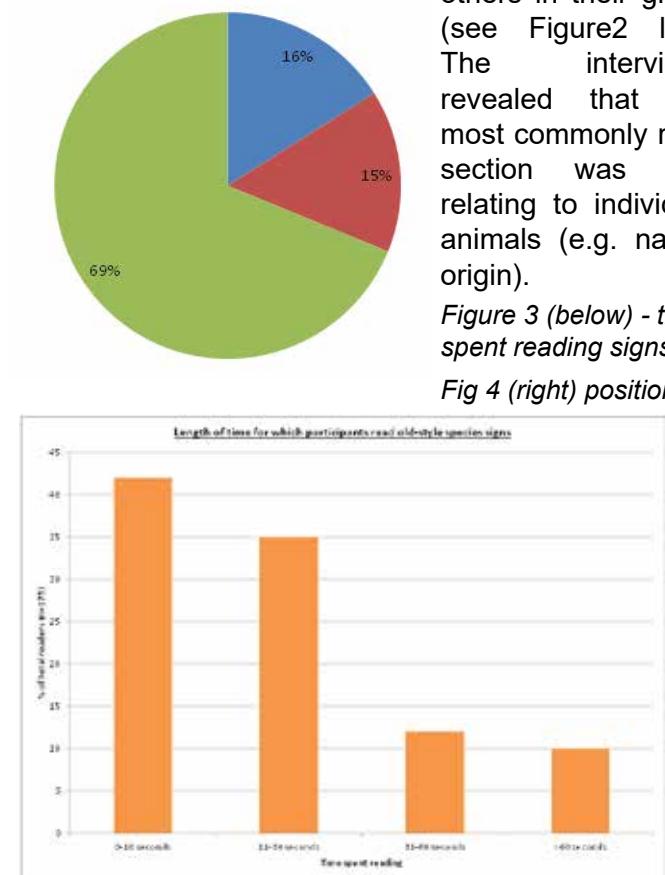
Most of the information in the signs was written in sentences. Sixteen specialist terms were present with the meaning defined. Seventeen specialist words were not defined. During the interviews it became apparent that the terms used to describe conservation status in the original signs were not understood in the context in which they were being used.

None of the signs in the study sample were totally ignored. However, for every sign except one (the sign for the leucistic tiger) the number of non-readers exceeded the number of readers. Overall, 69% of visitors ($n=386$) who entered the reading zone for a sign did not read it. Of the 31% ($n=175$) who did read it, about half discussed some aspect of the content of the sign with others in their group (see Figure 2 left).

The interviews revealed that the most commonly read section was that relating to individual animals (e.g. name, origin).

Figure 3 (below) - time spent reading signs

Fig 4 (right) position



The mean period for which participants read the signs was 23.3 seconds. Figure 3 shows that most of the participants that read a sign spent half a minute or less reading it, with 42% reading for no more than ten seconds.

Visitor Interviews

Most interviewees perceived themselves to be regular readers of zoo signs. Each participant interviewed had first looked at the information about the individual animals in the enclosures, hoping to find out their names and where they had come from. Three people said that they would be put off from reading a sign if it was too long. Almost all of the participants said they believed the signs in the study contained about the right amount of text. One felt that if the quantity of text was reduced some important information would be lost. One person said that the likelihood that they would read a sign depends on the species in the exhibit.

Do visitors understand the information?

Ten comments related positively to the acquisition of new knowledge and five comments identified that the headings and bullet points helped them to locate the information they wanted. Many positive comments were made about the suitability of information for children. Participant opinion and understanding about the information in the 'Key Facts' section was mixed. One mother thought that it was well laid out and enabled her to quickly and easily answer her children's questions. This was not a universal view though. Almost half the participants had either ignored or not even noticed that section. Every participant found the information about conservation status poorly explained. These symbols, terms and abbreviations were not understood by any of the participants.

Discussion

What factors affect visitor understanding of the information displayed on the species signs?

Quantity of text: More than two thirds did not read the signs. The mean number of words is approximately 400, considerably higher than the 75 suggested by Bitgood



(1991) as being the upper limit for maximising the likelihood that they will be read.

Position of sign: The species signs in this study were located on the safety barrier directly in front of the exhibit (see figure 4) and often obscured by people standing directly in front of them

Legibility: The participants interviewed all commented that the font and type were easy to read.

Readability: The readability assessments indicate that all except one of the signs are written at a level that could be read by children from nine to twelve years of age.

Do visitors understand the information on the species signs? When asked about the information presented on a sign most participants initially located facts about the biology of the animals and read them directly from the sign. Further questioning probed their understanding of what they had read and most participants expanded their explanations using their own words and referring back to the sign to support their comments. The information about the biology and ecology was considered by the participants to be clear and well explained. However none of them were able to understand the IUCN conservation terminology and classification data used on the signs. Although they understood that categories such as vulnerable or endangered mean that a species is threatened they were unsure about how these categories relate to each other or to how serious.

Applying Findings

Well-designed species information signs can be useful tools for communicating messages to zoo visitors, they are available throughout, however, to be effective they rely on people making a personal choice to read them.

This study also found that the vocabulary used to explain conservation information on the old-style signs was not understood. Addressing this was a priority when designing the new interpretation. The study findings have been utilised in the development of new species signage that has now been installed at the zoo. This is illustrated in Figure 5 below.

Visitor interviews tell us that they find the new signs attractive. For example one visitor commented, "Good layout. Eye-catching. You want to go and read them." Unfortunately this opinion was not supported by direct observation data. The new signs appear to have poorer attracting and holding power than those they replace (see figure 6).

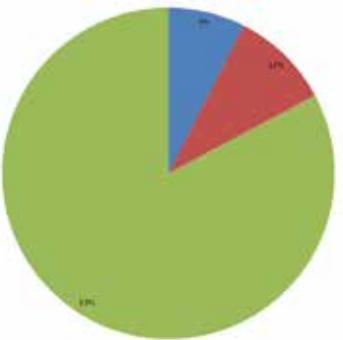


Figure 6. Pie chart showing sign-reading behaviour for the new signs. (83% did not read; 10% read by self; 7% read and discussed with others)

Figure 5 (below) - example of new sign design



This may possibly be explained by the fact that the new species signs do not include any biographical information about individual animals. ‘Who Lives Here?’ signs are displayed separately. Therefore time spent reading the new species information signs concentrates on biological and conservation information, whereas people who read the old-style signs spent a proportion of that time finding out the animals’ names and their personal history. It is somewhat disappointing that even though the signs were designed to maximise attracting power 83% did not read them at the time. However this result does correspond with the reading behaviour of visitors in Chester Zoo so perhaps we should not be too down hearted (Esson and Moss, 2015). Interestingly, several visitors were observed using smartphones to photograph the signs, so it is possible that they may refer to the information later.

Pleasingly, interviews revealed that conservation information on the new signs was better understood. A simple ‘traffic light’ symbol was chosen to illustrate the degree of threat to each species. Readers who desire more detailed information are referred to the zoo’s website, where the IUCN system is explained. In addition to the traffic light, each sign includes a ‘Without me’ section, which explains one reason why this species is of value. This was prompted by Aichi Biodiversity Target 1 which aspires for people to be aware of the value of biodiversity. Comments from visitors included: “Traffic lights help you see how seriously they are threatened.”; “The conservation stands out because of the ‘without me’.” and “Found out about the conservation - you can’t always find that out from wildlife programmes.” The zoo also received an unsolicited email from a visitor whose comments included “...the information boards outside the enclosures are the best I’ve seen from any zoo..... whoever wrote them should get an award”.

Conclusion

Well-designed zoo interpretation can stimulate wonder and the desire to know more, developing people’s ideas and attitudes in a positive way and enriching their understanding of the natural world. Conversely interpretation that fails to engage the visitor, or which presents information in a way that is too difficult to understand, may mean the opportunity to communicate important messages is irretrievably lost. Of course written signs are just one element in the zoo educator’s toolbox. Good zoos will use a selection of approaches to integrate information into their exhibits in many different formats, including immersive exhibits, written signs, keeper presentations and interactive displays. However evaluating our interpretation is essential - otherwise how will we know if it is effective in communicating our message?

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Birds of Paradise and Sexual Dimorphism: Using Zoos to Inspire Conservation in New Guinea

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Abstract Birds of paradise have become internationally known for their bright plumage, creative dances, and wild songs. These distinct attributes are what can be used to promote the conservation of this species and the entire region. Using their popularity, historical connections, and unique attributes, these birds can become a flagship species to preserve the New Guinea ecosystem with the help of Zoos. By promoting this species through signage and presentations, we can begin to educate the public on the importance of birds of paradise and in doing so, we can protect a plethora of other endangered species from fragmentation, loss of biodiversity and a number of other anthropogenic factors.

Introduction

New Guinea, a large island in the South Pacific, is home to a wide range of species but is best known for their tropical birds of paradise which have incredibly unique sexually dimorphic characteristics, including bright plumage, intricate songs, and playful dances (Freeman and Herron, 2007). In the case of birds of paradise, the male is generally more elaborate to entice a female; the female then chooses the more extravagant, productive mate. Since these birds are so unique (Jepson, 2015) and have a strong historical relationship to local tribes (Kirsch, 2006), they are an excellent candidate for a flagship species we can rally behind in order to promote conservation of the New Guinea ecosystem (Jepson, 2015).

Background

Currently, 36 of the 42 bird of paradise species are endemic to New Guinea, and even though they have wings, tropical birds tend to be reluctant to cross water, making this island their prime habitat (Diamond, 1986). Most male bird of paradise species are polygynous and territorial; therefore courting depends on attracting the female to their nesting area. A majority of the species has males with ornate plumage and exuberant courtship displays and females tend to be colored to blend into the environment (Irestedt, 2009). The females tend to pick the flashiest, brightest, and loudest males, consistent with the concept of sexual selection. Sexual selection occurs when one sex applies selection pressure to the other causing a change in a phenotypic characteristic used for mate choice, in birds of paradise, the brighter or bigger the better (Freeman and Herron, 2007). What is hypothesized for the bird of paradise is that the more elaborate features tend to intimidate competitors and promote higher reproductive success. Birds of paradise have one of the most notable cases of avian sexual selection (Irestedt, 2009). These beautiful characteristics imposed by sexual selection can be used to entice the public to care and respect these fascinating, and culturally significant species.

New Guinea Ecosystem

New Guinea has great biodiversity, but factors like anthropogenic changes, climate change and invasive species are all threats to the current ecosystem. Protecting the species of New Guinea is critical to prevent further detrimental loss or even extinction (Hope, 2014). There are a number of endemic bat species located on New Guinea, the Bulmer's Fruit Bat (*Aproteles bulmerae*) is just one of these species, which is near extinction, reduced to just 250 mature individuals in the wild and still believed to be on a steady decline. By protecting the birds of paradise, we protect the future of the Bulmer's fruit bat, and other critically endangered species (IUCN Red List, 2016). What is especially crucial for the bird of paradise and other species is stopping the ongoing forest fragmentation in order to protect their habitats. Fragmentation is threatening biodiversity, availability of nesting habitat, and preferred food sources (Sam et al., 2014). Segmented ownership of tribal land makes it difficult to preserve large regions, and only 2.8% of total land area is protected (Sam et al., 2014). Thus, it is important to involve local communities in the preservation of bird of paradise, a well-known, spiritual animal, and teach them how to live among these birds.

Historical Significance

Historically, the locals of New Guinea have always indulged in the art of decorating themselves with bird of paradise feathers. Rituals were often copied from the birds themselves, and it is thought that by wearing the feathers the animal's life force is absorbed by the wearer (Holland, 2007). But in the early 20th century, international trade boomed (Heads, 2001), as extravagant feather hats were the craze in European culture (Kirsch, 2006). Throughout this time period over 80,000 adult males were killed and exported a year (Heads, 2001). If the decline in numbers continues, indigenous peoples will begin to lose their culture, rituals, and the knowledge they contain.

Conservation & Zoos

The different species of birds of paradise have a large range, powerful presence, distinguishing features, and cultural significance, an ideal flagship species.

They are species that will attract financial support, thus having the potential to protect an entire ecosystem (Baura, 2011). Structuring a conservation framework around species like the bird of paradise, that symbolizes the area in need of conservation, could both benefit New Guinea and local zoos. Zoos provide the perfect environment to promote the conservation of birds of paradise species.

Over 700 million people visit zoos and aquariums every year (Moss 2014), giving them access to conservation education and allowing for an improved understanding of biodiversity. While not everyone will walk away with a better understanding of conservation, signage placement and information, and presentations, could play a key role in this process. Signage often presents us with species behavior and ecology information and introduces people to conservation challenges and indicates potential solutions (Fraser et al., 2009) and through this, people will often walk away with some awareness regarding the species. It also has been noted that zoo visitors who walked away with a greater understanding of a species, often developed a connection with them, which then often lead to a willingness to change their behavior in order to protect said species (Pearson et al., 2013).

If zoos are able to capture the distinct nature of birds of paradise and promote awareness, it could lead to a greater understanding of the New Guinea ecosystem and potential conservation (Pearson et al., 2013). Acquiring birds of paradise in their collection allows for the opportunity to utilize their attributes to promote conservation. Zoos are being recognized more and more as places to expose people to environmental issues and conservation challenges species face. Financially through donating to in-field partnerships developed by zoos and smart consumerism can help prevent habitat loss and fragmentation, which is driving a number of New Guinea species to extinction (Sam et al. 2014). Through presentations, signage, blogs, and promotion, zoos can tap into their market and help conserve birds of paradise, while also helping to protect all the other species found in the New Guinea ecosystem.

Conclusion

There is power behind using a culturally significant and well-respected animal to promote change and conservation. Their relationships to local villagers, historic environmental awareness, and their distinct physical attributes make them a powerful ally in New Guinea conservation. Their sexual dimorphism showcases a peculiar attribute and makes them uniquely qualified to become a flagship species. The birds of paradise are an intriguing, fun species to watch and engage with, and could easily be promoted within zoos in order to secure their future. With the local and global support of these species through zoos,

we can start to protect and preserve a spectacular ecosystem.

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What will it take to make you love me? Sparking love for local wildlife needs a fresh approach

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Introduction

Imagine a world where zoos encourage and support communities to save threatened native wildlife in their own backyards. With an innovative combination of engaging onsite and offsite initiatives, Zoos Victoria demonstrates this may be possible.

The Australian Government currently lists more than 1,700 species and ecological communities at risk of extinction (Aust. Govt, DSEWPC, 2010). Zoos Victoria (ZV) is addressing this crisis with its commitment to save 20 local species that without intervention would face extinction within ten years. Its mission is to galvanise communities to commit to the conservation of wildlife and wild places and achieve this by connecting people and wildlife.

Critical to the success of meeting this commitment is in ensuring the local Victorian community knows about these animals, cares for them and takes action on their behalf. With present knowledge and care for these species at very low rates amongst the Victorian public, the Love Your Locals (LYL) campaign provides a way to raise their profile. Addressing this challenge requires ZV to target a range of different audiences and test a range of educational and behaviour-change techniques.

Two case studies are outlined which illustrate new educational methods being trialled to meet this challenge. Case Study 1 focuses on engaging individuals who may never visit a zoo. The use of guerrilla-style techniques in the “Rob the Frog” initiative helped to educate and engage an immense audience in the Zoo’s work to save a local frog species. Case Study 2 focuses on how engagement and learning initiated as part of a zoo visit can drive the formation of “learning hubs” within the wider community. Schools undertaking programs linked to the LYL campaign go on to become expert advocates for one or more of the twenty local species.

Case Study 1 – “Rob the Frog”

Preliminary research amongst the Victorian community indicates very low levels of recall and recognition of the LYL campaign species (Pearson, 2016, pers. comm.). A different approach is required to raise the profile of these animals and engage Victorians who rarely, if ever, visit any of ZV’s three zoos. The “Rob the Frog”

activation was trialled on Valentine’s Day 2016 as a way to engage urban residents in the plight of the Southern Corroboree frog (*Pseudophryne corroboree*), educate them about the threats it faces and facilitate them to share its story through social media networks.

Methods

200 plush toy Southern Corroboree frogs with tags attached saying “HELLO my name is: ROB” were dropped at various city locations across Melbourne’s central business district from 8am on February 14th, 2016 (Figure 1). The toys were free gifts for members of the public who discovered them. ZV staff observed the toys at a distance until all were collected. The tags included a web address for a supporting webpage and animated video (created by Nigel Coan, and voiced by comedian Noel Fielding) (Figure 2), and requested those who found the frogs to upload photos of them onto social media, using the hashtag #robthefrog. Several high profile Victorians were also provided with frog toys and asked to upload photos onto social media platforms. The narrative and animation of “Rob the Frog” highlighted the threat of chytrid fungus to Southern Corroboree frogs in a comedic and anthropomorphic narrative: It illustrated the challenge ‘Rob’ has in trying to find love (i.e. a breeding partner), due to chytrid fungus. Valentine’s Day was selected as an appropriate date for the trial, due to the narrative links of ‘finding love’.



Figure 1. ‘Rob the Frog’ toy at National Gallery of Victoria and Flinders St Station, Melbourne. Images by Jacquie O’Brien and Rick Hammond.



Figure 2. Still image from the 'Rob the Frog' animation used on the www.robthefrog.org.au webpage. Image by Nigel Coan.

Results

Success of this initiative was measured by a number of elements:

- All 200 frog toys were claimed by members of the public across the 15 sites;
- Across Facebook, Twitter and Instagram, the images of 'Rob the Frog' reached 265,158 people;
- Coverage of the story on a major network's prime time news reached an audience of 304,000 people;
- The "Rob the Frog" animation was viewed over 32,000 times in 24 hours;
- Over 175 photos were uploaded to public Instagram accounts using #robthefrog and included several high profile media personalities (Figure 3).

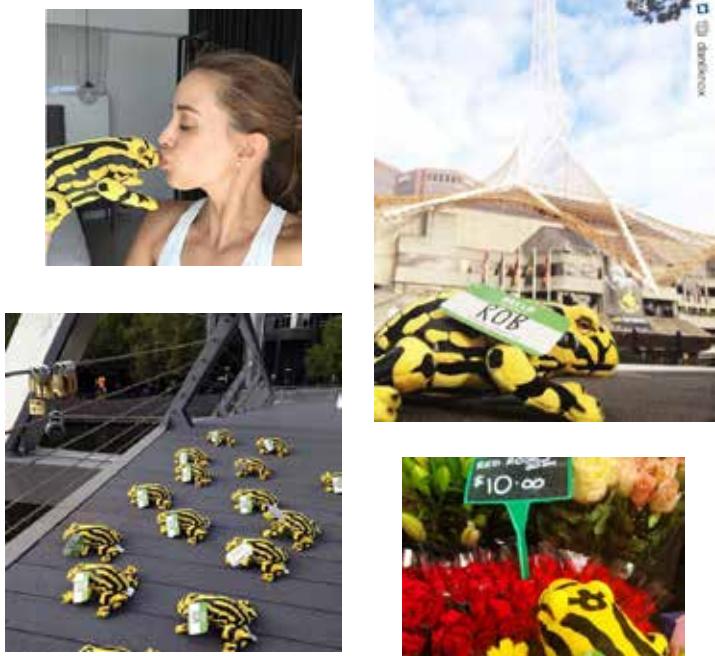


Figure 3. Selection of images of #robthefrog posted on Instagram by accounts: @becjudd, @jellothere75, @danilknox and @vicmarket.

Case Study 2 – Community Learning Hubs

ZV developed a program to bring schools and community groups together in a community learning hub (CLH) to help fight extinction through an experience that involves ongoing exposure to conservation messaging. A CLH (Black, 2008) is a collaboration between school education systems and other sectors (community, business, local government and philanthropy) to support the learning and wellbeing of young people. How CLHs are developed depends on the unique context of the schools and community groups in question. (Figure 4).

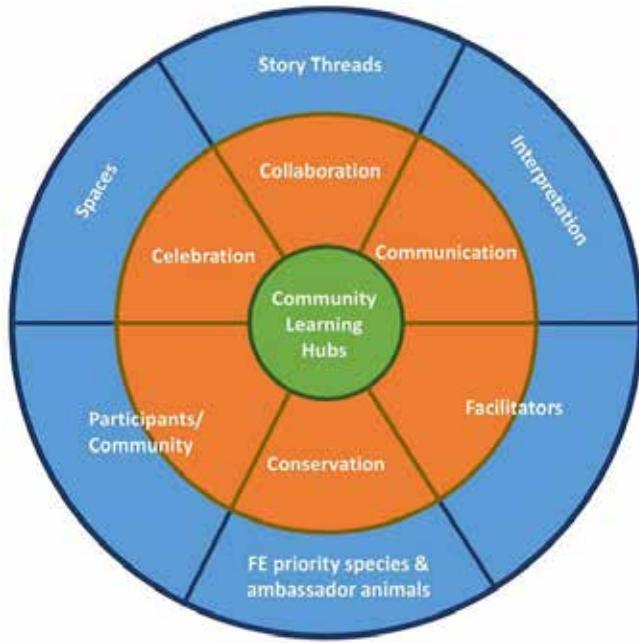


Figure 4. Zoos Victoria Community Learning Hub Model.

Figure 5 (below). CLH members attending the celebration day at Werribee Open Range Zoo with 'Zoopergirl'.



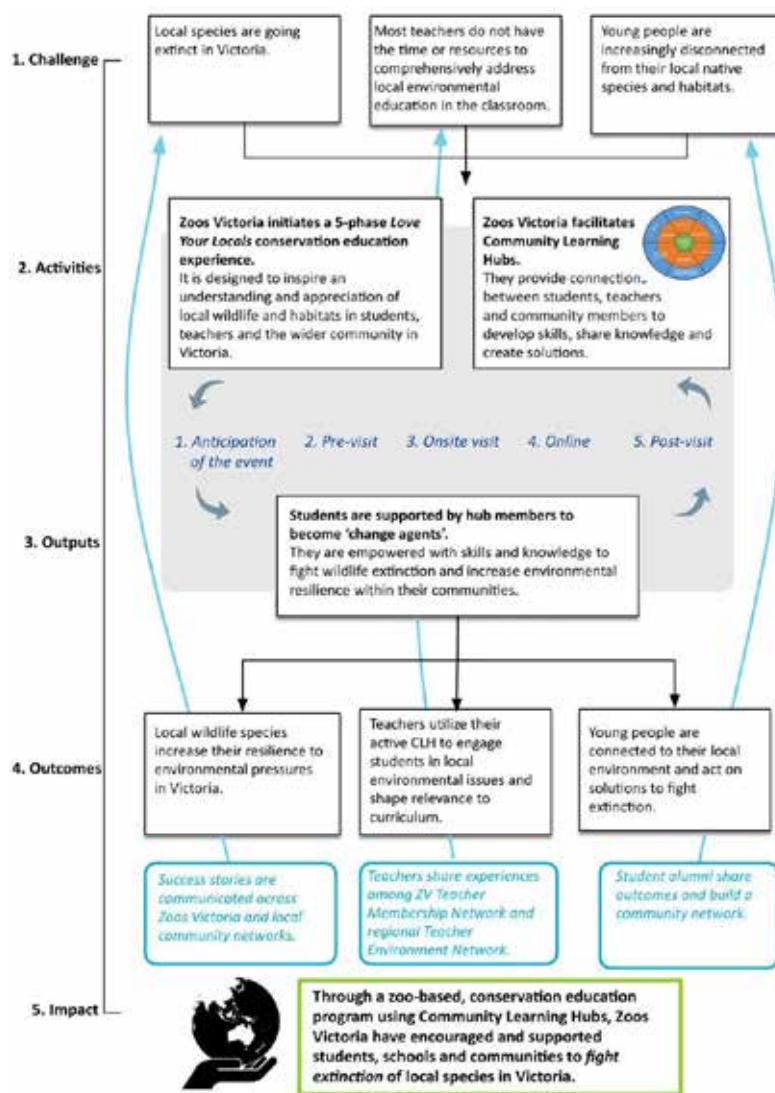
The program was trialled at Werribee Open Range Zoo (WORZ) and involved 100 students aged 10-12 years from local schools, across three school terms beginning in May 2014. Students were invited to become Extinction Fighters and the focus species was the eastern barred bandicoot (EBB) (*Perameles gunnii*). The challenge for students was to educate their peers and wider community about the EBB, and to develop tangible, ongoing actions to address the threats it faces.

Their ideas and campaigns were presented to all CLH members on a Celebration Day at WORZ on September 10, 2014 (Figure 5), after which they shared their project and conservation campaign with their peers back at school, and implemented their respective campaigns within their community. Communication between hub members, including the schools, Wyndham City Council and WORZ was ongoing through a closed social media platform called NING. Using NING, subsequent school visits and follow-up activities, the aim was to encourage and support ongoing action to help ZV fight extinction.

Methods

Building upon the existing Connect – Understand – Act model (Lowry & Gray, 2009) that already underpins environmental education at ZV, we developed a Theory of Change (TOC) for the long-term LYL program to outline a pathway to achieve our vision and ultimately have impact (Figure 6 below).

The Effective Interpretation Program model (Orams, 1997) was used to inform the development of the five activity phases within the TOC. The five-phase experience was used to break down and examine the psychological perspective of the students at each point



throughout the program. Education and behaviour change theories including Transformative Learning (Cranton, 1994), Multiple Intelligences (Gardner, 1999), Multi-sensory Learning (Christie, 2000), Inquiry based and Values-based learning (Edelson et al. 2010) informed the development and implementation of the program.

To measure and evaluate the LYL program across those schools, two online surveys were designed and implemented using the software tool PollDaddy. Questions were multiple choice and each answer required an open ended qualification which allowed assessment of the variability in experience and understanding, and the unique and individual actions taken by schools and students to protect local wildlife and habitats within their community.

Results

The overall objective of the surveys was to provide an indication of change (positive or negative) in participants over the course of their three-term experience, and if teachers would like a Community Learning Hub to become a permanent offering to their grades 4-6 students:

- 100% of students had taken action since presenting their campaigns at the WORZ 'celebration' day;
- Actions undertaken by students included: native grassland restoration; establishing cat curfews; website creation; art exhibits; and print media.
- 91% of students spread their conservation messaging to peers throughout their school and communities;
- 100% of schools wanted to continue being part of a CLH to fight extinction;
- 73% of teachers identified very strong links to curriculum needs, 27% identified strong links;
- 100% of students felt more connected to the program having their school name their own EBB;
- 100% of schools valued the ongoing interaction and updates from WORZ staff and other hub members (via online updates and school visits);
- 100% of schools would like to participate in the program again.

The observations, feedback and collation of qualitative data suggested establishing LYL Community Learning Hubs across all ZV zoos would be a valid step toward targeting the next generation of 'change agents'. The results confirm that schools deemed the LYL program as highly valuable. It linked to curriculum needs, while encouraging life-long ambassadors for wildlife by participating in a repeat exposure experience to fight the extinction of the EBB alongside ZV and other community members.

Discussion

These complementary case studies utilize contrasting techniques to connect the widest possible audience to the same LYL campaign. One is characterised by its short-term approach of introducing individuals to a lesser-known local species, and the other, a longer-term, in-depth program utilizing CLH, as part of a TOC, to target behaviour change in students and alleviate threats to local wildlife.

Whilst initiatives like ‘Rob the Frog’ are short-lived and engagement may be seen as shallow, this trial indicated great promise with hundreds of thousands of Victorians engaging with and learning about a little known and barely recognised species – all within one day. Initiatives like this can be used to great effect to raise the profile of lesser-known species, and educate audiences less likely to engage with zoos, particularly when used at critical times. The high numbers of individuals engaged can be built upon and used by other LYL programs facilitating pro-conservation behaviours, by helping to establish a social norm and increase social diffusion of a campaign (McKenzie-Mohr, 2013), thereby increasing the success of subsequent behaviour change programs.

Further follow up is underway to determine whether this, along with the other LYL initiatives and programs, have a long-term effect on increasing recall of these species, care for them and ultimately pro-conservation behaviours being undertaken.

The CLH was designed to encourage students to fight the extinction of local wildlife (in this case the EBB) through collaboration between members with a shared purpose. The five-phase experience can be tailored specifically to the needs of each zoo’s strategy. In this case it galvanized communities to commit to wildlife conservation by reaching beyond the zoo and collaborating directly with local communities. Community groups came together to participate in conservation actions that benefitted local wildlife and the ongoing sustainability of the communities they share.

Conclusion

Changing human behaviour is notoriously difficult in an educational context (Johnson and McInnis, 2014). If the zoo community is to make a positive contribution to wildlife conservation, carefully designed education programs incorporating behaviour change strategies must be adopted. A handful of zoo studies that have been conducted demonstrate a potential link between education programs and behaviour change, indicating an education based zoo visit can improve visitor knowledge (Packer & Ballantyne, 2010; Esson & Moss, 2013; Dove & Byrne, 2014; Moss et al., 2014).

However, knowledge increase is short lived, and

without a framework within which to support and expand on the experience, its potential long-term benefits decay quickly (Johnson and McInnis, 2014).

Zoos have the potential to drive major change within their communities, and be advocates for lesser known species, but they need to continually measure the educational and behavioural impact of their programs and trial new ways to engage their onsite and offsite audiences. These two programs illustrate two complementary yet contrasting ways zoos can target varying audiences and help them engage with the same campaign.

Quirky and innovative stunts like “Rob the Frog” can measure their short-term impact but also need to be built into longer-term goals and targets so that they become part of a bigger whole. In the case of the LYL campaign, this stunt is one of several planned initiatives being undertaken by ZV, supported by ongoing research into levels of understanding and care toward these species. Similarly, the CLH TOC can be a blueprint for zoos globally to help save their native wildlife from extinction by targeting, empowering and supporting those students, schools and community groups most connected to specific local species and habitats. Based on the results of the trial, it is recommended that a long-term, dedicated research study be developed to prove that implementing this TOC in conservation-based zoo education programs can work to change the behaviour of student visitors and begin to address the decline of endangered native species.

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Eastern barred bandicoot (Zoos Victoria)

Sensory Trail, an initiative for the inclusion of people with disabilities in conservation education programs.

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1. Introduction

A common event in the operation of any facility that receives visitors, is the arrival of a person or group with a condition that does not allow them to make use of the facilities or participate in activities in the same way as others. The staff assigned to receive visitors often get challenged in meeting people in this situation, and often have to deal with more than one condition that hinders their integration with others.

The World Zoo Conservation Strategy (WZACS) declare that the interpretation of live animals is essential to enable the public from any social condition in a positive way against everything related to environmental conservation. These conditions must include several social minorities such as: people with disabilities, the elderly and vulnerable groups. Their access to education programs is one of their human rights of major concern, as well as a priority for our institution.

In Mexico, 5.1% of the total population has a disability (INEGI). It is necessary for zoos and aquariums to have activities, materials and specialized staff available for these users. The services provided to these users will result in an improved quality of life for themselves and their families, their incorporation in the community and in the construction of a more just citizenship.

Disability is any restriction or limitation on the ability to perform or participate in activities within the range considered "standard" for a human being, due to the lack or loss of a structure or anatomical, physiological or psychological function.

Disability is not a disease or a state which is suffered, but a condition of life. For its attention, several models have been developed, from the charity and medical models to the social model that considers social factors as the real cause of disability, not allowing the inclusion of people with disabilities by using their alternate capabilities.

San Juan de Aragon Zoo has always offered an integrated education approach that addresses the needs of people who work and visit our facilities.

These needs not only consider the general services offered to visitors but the particular conditions of the various target groups that receive and serve, from the perspective of inclusion and integration.

Education is one of the objectives of modern zoos and it is not only accomplished by showing

the value of natural heritage of the exhibited species but also highlighting the importance of the impact of human actions on the conservation of flora, fauna and environment.

In education, the inclusion answers to a philosophical, social, economic, cultural, political and pedagogical approach that seeks the participation and appreciation of differences in the learning processes. Conservation education seeks the inclusion of different teaching strategies to facilitate community participation in the knowledge and protection of the environment, adapting to the needs and capacities of the learner.

In this sense, inclusive environmental education is the mode of conservation education that aims to extend the knowledge on the non-immediate environment for persons with disabilities, promoting their access in the field of environmental education, considering their value as individuals and the importance of their participation in improving the environmental quality as well as in building an environmentally responsible society.

The practice of inclusive environmental education is not simple because it requires training by facilitators and new practices and attitudes to adapt the established educational approach for the use of different capacities. Similarly requires to adapt the facilities, materials and activities to reduce or eliminate barriers for learning, however, its implementation foster the fulfillment of our institutional mission:

Promote the conservation of threatened or endangered wildlife species, through environmental education, scientific research and ex-situ breeding, giving visitors the opportunity to learn and admire in these public spaces, the natural diversity of flora and fauna from around the world, with emphasis on Mexican species.

Institutional Vision:

Consolidate Mexico City's zoos as local, regional and global leaders in biodiversity integrated conservation, managing wildlife populations at the highest welfare standards and developing research and education to promote their and their habitats survival.

2. Background

Given the environmental issues of any large city in the world and the ignorance or apathy of the population to these problems, San Juan de Aragon Zoo has an Education Department that began operations with the reopening of the zoo in December 2002.

This department has provided support for the integral education of visitors and staff with educational and recreational activities to encourage participation and interest in the conservation of the biodiversity of their surroundings by developing new experiences that build and promote meaningful learning values and attitudes.

The San Juan de Aragon Zoo's Program for the Inclusion of People with Disabilities has been strengthened through the training of education staff, advised by specialist in the assistance of people with disabilities, and adapting spaces, materials and activities that promote their accessibility and participation in society.

In collaboration with partner institutions such as: Fundación Ilumina, Paseo a Ciegas, CRIT, INDEPEDI, Megavisión and Red de Museos para la inclusión de personas con discapacidad, seeks to extend the scope of these activities for blind and vision impaired people, creating a new space that promotes environmental awareness by using senses other than sight.

Previously there have been groups of people with this disability and has been integrated in regular activities, adapting them to meet their needs, however, the sensory trail is space with activities specially designed for this population. At the same time it seeks to raise awareness of people without disabilities about the needs of the visually impaired, making them participate in the same activities facing

the difficulty of losing their sense of sight to promoting attitudes of empathy and solidarity.

3. Objectives:

Promote the inclusion of visually impaired visitors in environmental education activities generating in them the knowledge, skills and attitudes that enable them to value and participate in the conservation of wildlife.

- Have a space and materials to allow blind participants to use their alternative senses to learn about the flora and fauna and deepen the knowledge of the environment.
- Promote among visitors with vision, the experience of using alternate senses to re-know the environment and be aware of the needs of people with disabilities.

4. Proposed Work

Operate a sensory trail in a guided tour modality that will allow visitors to know the distribution of our zoo, the features of the flora and fauna of every area and be introduced into environmental topics through the use of their senses other than sight.

The San Juan de Aragon Zoo's Sensory Trail was inaugurated on November 27th 2014 on the celebration of its 50th anniversary. It consists of a rustic road, lined on both sides with logs, with a length of 497 meters (1640 ft) (Figure 1) and a total of 10 stations (Figure 2) that will lead the visitors to know the flora and fauna that are on display and to describe their environmental situation, to inform how people affect their conservation status and to allow themselves to suggest conservation actions

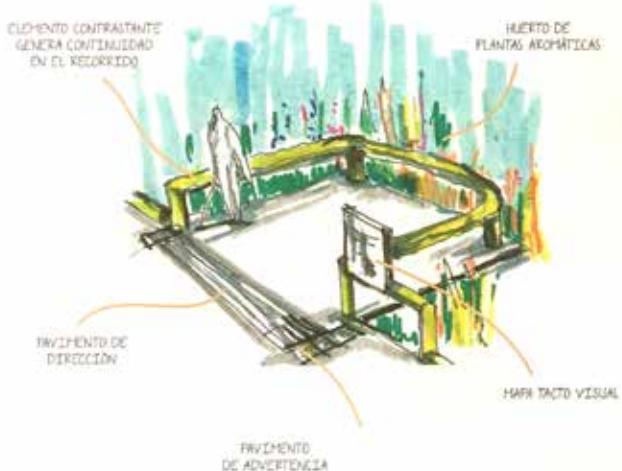
planta arquitectónica



propuesta arquitectónica
sendero sensorial

Zoológico de San Juan de Aragón

jardín de las plantas medicinales



The distribution of stations is as follows: (Table 1).

	Station	Topic	Materials	Senses used in the station	
1	Map	Sensory trail structure	Guide sticks, masks, tactile map	_TOUCH_	Instituto Nacional para la Educación de los Adultos from the Public Education Ministry. In addition, the education staff participated in the 2nd Disability Fair in which they presented the materials used in the Sensory Trail and in which a total of 144 people participated.
2	Mexican Trail	Mexican Wolf and jaguar, priority species for conservation	Jaguar cranium replica, jaguar and wolf paw prints, jaguar sensorama, jaguar and wolf recordings	_TOUCH_	In 2015 a total of 258 visitors participated in these activities. The education staff was invited to the 3rd Disability Fair and participated in the Inclusion Day and the expo-congress of the Instituto para la Integración al Desarrollo de las Personas con Discapacidad (INDEPEDI). The zoo joined the Museum Network for the Inclusion of People with Disabilities. On this year the education staff organized the first concert in sign language for the deaf, with the title "Christmas in the zoo"
3	Medicinal Plant Garden	Traditional use of medicinal plants	Leaves of medicinal plants, tea, paper cups	_TOUCH_	From January to April 2016, a total of 78 visitors participated in the sensory trail. A second concert in sign language was presented with the title "Children and Earth Day". On April the zoo was evaluated on accessibility for people with disabilities by INDEPEDI.
4	American Trail	Seals and Sea lions	Seal and sea lion plush toys	_TOUCH_	
5	Pollination Garden	Animal-plant interaction: pollination	Flowers, butterfly wings, artificial butterflies	_TOUCH_	
6	Arboretum	Animal-plant interaction: habitat and feeding	Pine, palm, fruits	_TOUCH_	
7	Arid Zone Garden	The plants of the mexican desert	Thorned plants	_TOUCH_	
8	African Trail	Large vertebrates	Jiraffe and gorilla cranium replica	_TOUCH_	
9	Old Zoo	Reptiles and large herbivores	Horns, antlers, snake shedding, crocodile replica	_TOUCH_	
10	Education Area	Conservation education	Didactic games, recorder or cell phone	_TOUCH_	

The trail uses some structural elements such as aromatic plants, a fountain and ends at the same point where it starts to facilitate the orientation of participants in space.

5. Education Messages

Education messages proposed for this activity are:

- San Juan de Aragon Zoo, its history, objectives and species.
- Zoos play an important role in wildlife conservation
- Through conservation actions we all can help to prevent the extinction of species.

6. Evaluation

Evaluation processes are important because they allow to quantify the interest of the public for certain

activities and services provided, the depth and quality of the information discussed with the visitor, the impact of the education strategies for the conservation of the species and the attitudes and values constructed in individuals through the contact with society and environment.

The last stage of this activity is a summative evaluation of semiformal type. Participants discuss their feelings, emotions and opinions about the experience and the interpretation offered by educators. Being with eyes covered and unable to write, the comments are recorded using a cell phone and transcribed to track and take into account to improve the program.

7. Results

Quantitative: During the first year of operation of the Sensory Trail, a total of 169 people participated in the activities. The institutions that have requested this service are: Paseo a ciegas, Escuela de perros guia para Personas con Discapacidad Visual, Fundación Ilumina,

Instituto Nacional para la Educación de los Adultos from the Public Education Ministry. In addition, the education staff participated in the 2nd Disability Fair in which they presented the materials used in the Sensory Trail and in which a total of 144 people participated.

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Qualitative:

San Juan de Aragon Zoo strengthened its Inclusion Program for People with Disabilities with the opening of the Sensory Trail. The comments made by participants show that the use of alternate senses to sight, involve reconstructing the previous knowledge to rediscover the environment, its flora and fauna.

Experiential learning applies in this activity for understanding the natural world. In it, the experiences during the activity are important in building knowledge and changing attitudes.

Participants with disabilities find a way to get closer to nature, allowing them to expand their knowledge of the environment, raise awareness of their non-immediate environment and appreciate and participate in wildlife conservation.

The emotions experienced on the path for non-disabled people are mainly of stress or fear for facing an unknown situation, however educators generate assurance to carry out the activities and participants gain confidence as they understand that it is a controlled situation where the risks are minimized (figure 4). This experience generates empathy towards people with disabilities. Likewise, it allows more aware of the proper way to offer and provide quality assistance to people with visual disabilities, facilitating their integration into everyday activities and strengthening the social model of inclusion.

8. Conclusions

The Sensory Trail is a useful strategy for the accomplishment of the institutional mission and vision within the framework of government policies, to provide space for the inclusion of people with visual disabilities and promote the social model of inclusion that seeks accessibility in facilities and activities for people with disabilities. Thus the participation of minorities in the important work of environment conservation is achieved. Similarly, it meets the World Zoo Conservation Strategy allowing these visitors to acquire a positive position regarding their participation in wildlife conservation.

This activity represents for the people with disabilities an opportunity to use their skills in building new knowledge about their non-immediate world. Similarly supports their integration in society, their interaction in a group and the expression of their thoughts and feelings. The Sensory Trail also offers volunteer opportunities as group guides or in horticultural work. It also results in a significant learning for people without disabilities because it generates attitudes of empathy and solidarity, developing skills to help a disabled person, while re-constructing the knowledge on flora and fauna features that were not perceived through the sight.

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Animal training lessons – what can we apply to our visitors?

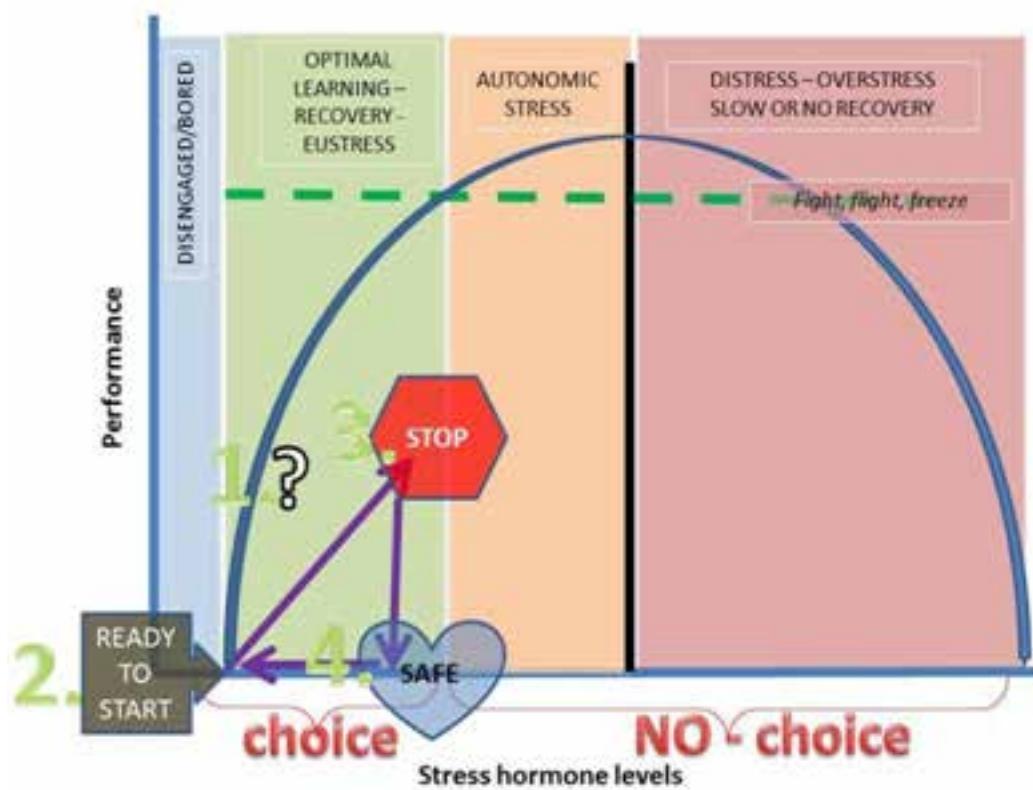
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At uShaka Sea World animal behaviour management ensures the welfare, health and effective presentation of the ambassadors in our care. The animals assist us to achieve our goal of inspiring our visitors and modifying their behaviour - hopefully helping them to become more conservation-friendly humans. Just as we modify the behaviour of animals, so too are we trying to modify the behaviour of our visitors. There are some animal training lessons that are relevant to our goals with people. This article will outline some animal training concepts and detail the potential for these to be used for more effective visitor interpretation.

We are socialised to live according to the expectations of people and society. This affects our sense of self and our behaviour. People are conditioned to be goal-fixated (extrinsic) rather than taking time out to simply enjoy the ride (intrinsic). Living for the outcome leaves us in a constant state of stress. Much the same as a trained hungry food-driven animal may feel. Constantly out of control of the resources (or people's opinions), and yet striving for acknowledgement (reinforcement – food or glory).

Figure 1. An adaptation of the original Yerkes and Dobson curve



The premise of this article is the following: Being in a stressful state does not bode well for effective long-term behaviour change.

The 1908 Yerkes and Dobson law about learning depicts performance from a state of 'boredom' to engagement and finally to impaired performance as a result of too much stress. The performance curve on the graph is a bell shape (Figure 1). In 2007 research on stress hormones in the same learning scenarios confirmed the shape of the original performance curve.

Because of its relevance to choice-based learning, we have adapted the depiction to include the autonomic stress phase. In the autonomic phase, flight, fight or freeze occur. Daniel Goleman, an author and psychologist referred to this state as the 'amygdala hijack', where a stressed organism's primal survival instinct overrides rational thought.

On Figure 1 there is a midline after which stress hormones become debilitating or even fatal. Recovery, where residual stress hormones are reduced as a result of success, is no longer normal or immediate. Choice-based learning only occurs in the green quadrant. Stress is predominantly caused by a sense of feeling out of control. When we feel out of control, our primal

need to look after our survival is piqued. If an animal is learning in the green quadrant, any stress hormones in the learning process immediately return to normal when the animal succeeds.

Learning in the orange zone is where we react to something automatically. Learning in this zone is powerful, because the result, when we succeed, is a physiological relief where stress hormones are reduced. However, the learning is not conscious or 'choice-based', and is largely through association. Here is an animal training example.

We are introducing a seal to a novel item in the shape of a green ball. We think that he will have no problem with the ball, so while a trainer has him in session, a second person tosses the ball into the water. The seal takes fright and swims away, and is hesitant to return to the trainer. What happened on the stress diagram? The seal lost perceived control when the ball landed nearby. Remember a lack of control is experienced as a primal threat to our survival. The animal's stress hormones jumped into the autonomic zone. Without thinking, and to re-establish a sense of control, the seal swam away from the perceived threat. The seal felt safer away from the new object and trainer. The stress hormones reduced. As far as association is concerned, the animal then associated the fear with the trainer in the session, and hence is hesitant to return to the trainer. A human example, if someone is afraid of snakes, and finds a dangerous snake under a chair there is a strong possibility that the person would be nervous of sitting in that same chair for a while. Subconsciously the person's body would work to avoid this space. One had no choice in the learning.

Responses in the orange zone are not predictable. The reactive mind will respond with one of three options - flight, fight or freeze. In the orange zone we are working to regain perceived control. At our most primal level, security is feeling in control. Hence, a basic biological need. In training language – a primary reinforcer. For example, a wife is stressed because her husband has not paid a bill. Her stress hormones shoot into the orange zone. She reacts by yelling. This reduces her stress hormones back to green. Nothing has changed, but she has the feeling that she is in control once more – primary reinforcer. This means that in future when the bill is not paid, she will once again yell. The comfort zone (feeling in control) has been re-established. This is the crunch. The behaviour of resisting change is primarily and so radically reinforced. The behaviour is protecting the status quo. So effectively, no behaviour change will occur.

To effect behaviour change, we have to keep people and animals in the green zone. So how do we keep animals out of the orange zone/reactive mind? We will illustrate. Thereafter we will extrapolate to how we can do this with our guests so that we provide the greatest potential for their behaviour to change.

An animal feels a sense of control is their 'comfort zone'. If we are able to teach an animal something just beyond the comfort zone, they have the potential to succeed in their learning, because they have choice to return to their comfort zone. If we stray too far away from what they know, the lesson may result in too much stress and a reactive response. Our jobs as animal trainers is to steadily increase the size of an animal's comfort zone. If we do not do this effectively, it is possible that

the comfort zone can actually decrease in size through too little or inappropriate stimulation.

To ensure that we maintain choice and access to the comfort zone during training, we have identified four key points to keep the animals in the green zone. These provide the animal with the required sense of autonomy - a sense of being in control.

Point 1: PAYOFF - If we were to ask the animal 'what is your pay off for doing this?' we must be sure they know the answer - food, fun or attention perhaps.

Point 2: The animal must show that they are ready to participate. With the seal and the green gym ball, we should rather introduce the object in progressive steps, while the animal is focussed and attentive to the process.

Point 3: There must be a 'safe place' already trained. Somewhere the animal is always free to go if the learning becomes overwhelming.

Point 4: The animal must always have the ability to 'stop' the stimulus. If the seal looks hesitantly at the green ball, we should retreat before it becomes reactive. Hence, he has the power to stop our advance.

We will outline below how we utilise these four points for our guests with these four options to keep them in the 'green zone'. Remember, in the green zone we have the greatest potential to change our guests behaviour.

Point 1: PAYOFF – refers to consequences to any actions our guests may experience, and thus refers to a variety of undertakings we offer our guests:

Reason for visiting:

As has been found around the world, our research shows that our guests visit to 'have fun', 'learn' and 'spend time with their families'. Therefore we weave our conservation messaging into all guest experiences in the park.

Clear payoff messaging:

Our suggested 'calls to action' must be relevant to our guests. We cannot assume, for example that all our guests love animals. If we used this love as their payoff to not litter it might not be effective for all our visitors. Being as specific as possible to the personal needs of our guests is required. For example a selfish imperative may be more appropriate to some audiences. In the case of litter – reducing litter is good for your health. It means less mosquitoes and environmental toxins and it can save money.

Limit of the 'pay off'.

If an animal is working only for extrinsic reinforcement, such as food, once his end is achieved, the learning ends. The same must be said about our guests. For this reason we are always working to generate intrinsic motivation by working towards creating connections with the environment so that they

naturally feel drawn to do the right thing. We do this in a variety of ways including the following examples:

- Offering vicarious caring opportunities. For example in our dolphin presentations, trainers to interact with the dolphins at an emotional level.
- In the turtle presentation a guest meets the turtle, in front of all audience members.
- We encourage staff in general to 'be in love with what we do' and to share this passion.

Too little payoff:

Just like humans, if animals fail too often, they become disheartened. To afford that sense of being in control, we consciously 'set the animal up to succeed'. For example, if the guest relays an incorrect response, staff do not make them feel wrong, but guide them to the right answer.

Payoff is not punishment:

Conservation horror stories overwhelm our guests and may push them into the reactive mind. Where, as we have seen, they will justify not changing their behaviours. We need to provide facts, but need to balance them with effective calls to action to prevent them from going into the orange zone. If we want their behaviour to change we have to keep them consciously thinking.

Point 2: Guests start the learning. To prevent stress, the guest needs to be able to choose the start to the learning. Our guests enter on their own terms, and so arrive in a receptive state. Our goal is to keep them in that state. To do this we provide them with a program, which details a variety of 'free choice' opportunities throughout the park. Our guest relations guides are mentored to notice guests who appear receptive, and to interact with these.

Point 3: Stop the lesson. Our guests always have the choice to leave. Where challenging points are found solutions are needed - for example, our guest relations guides are taught how to notice guests that feel anxious in the aquarium which is underground, and assist them to exit.

Point 4: Safe place. It is easy for us to relate to the need to have a safe place to which we retreat when feeling anxious. Our facilities are usually seen as safe-havens. It is our job to ensure that this remains the case, so that our visitors feel safe and secure. Feeling in control is much easier in a clean, litter-free facility. It is our job to proudly ensure this.

Besides these four points, there are a few more animal training mechanisms that have significance with our guests.

- Focus on the behaviour we want and ignore what we don't want.

We do the same with our guests. Reinforcing the fact that we believe they are making appropriate conservation choices. Thus they don't feel singled out.

- Have faith in the lesson

If we want a seal to wave its flipper, but we always manipulate the flipper rather than letting him choose to move it, the animal is not learning. He needs to choose to cooperate. The same is true for our guests. If we don't give them time to reflect, they will not choose to learn. The very nature of our park provides reflection time so keeping them in the green zone. Our 'calls to action' also provide empowering options to consider

- When training animals, if our communication is clear, the animal feels 'in control' and intended learning is effective. Simple clear communication keeps our guests receptive, increasing the possibility of them choosing to change their behaviour.

With our wonderful facilities we have the perfect opportunity to provide people with a sense of control and choice. They can feel enriched and safe when they visit us. They are in the green zone. We have a laboratory space in which we can positively influence behaviour and make them more blue and green. So let's do it.

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Visitor Study at Barranquilla Zoo: Time & Tracking

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Introduction

Zoos and aquariums are usually seen as recreational or entertainment centers. In fact, recent market research conducted by Fundación Botánica y Zoológica de Barranquilla, rated the Barranquilla Zoo as a space for recreation and entertainment over its educational potential (FUNDAZOO, 2014). This situation has led us to question the needs, expectations, behaviours and real learning opportunities that visitors have when visiting the Zoo. It is important to note that of the many definitions of learning, we have selected one inherent to modern constructivism that extracts three prototypical traits of good learning, which would imply a long-lasting change, transferable to new situations as a direct consequence of the experience (Pozo, 1996).

But, where to begin? Certain authors include the dwell time in zoos as one of the factors that influence learning (Hein, 1998; Serrell, 1998; Serrell, 2000; Ross and Lukas, 2005) and given that the average dwell time of a visitor in an area of the Zoo (exhibit, path, station, point of interpretation) can be very brief, the learning opportunities could also be very limited

(Serrell, 1998). In other words, the experiences provided to visitors must impact and be effective in very little time to attain learning that can be evidenced and assessed; in this way, one could learn the behaviors associated to the efficient use of educational resources by the Zoo, looking into the major characteristics of visitors during their visit.

This article presents part of the results of two Timing & Tracking studies, a technique that consists of observing visitors during visit to the Zoo, conducted during 2010–2011 and 2014–2015. The purpose was to determine whether the improvements implemented as a result of the findings of the first study made a difference in the behavior and dwell time of the visitors that took part in the second study. In addition, it was also researched whether the Zoo facilitated conditions to promote learning.

Standardized Study of Visitors

Developing standardized methods for assessing visitor experiences is one of the main challenges of modern zoos and aquariums. Their purpose is to explore motivations, interests, expectations, attitudes and behaviors of the public in order to relate them with compliance of the educational objectives of said centers (Ross & Lukas, 2005). Tracking techniques and time

spent at an exhibit (dwell time) are mechanisms that presently allow for a detailed recording of where they go, how much time they spend at an exhibit or area and, overall, what visitors do at an informal education center (Yalowitz, Bronnenkant, 2009). Melton (1935), was the pioneer of these observations that record visitor movements in museums (Tracking), to which others highlight the importance of measuring the time that visitors spend in observing the exhibits (Timing) such as Serrell (1998), Ross and Lukas (2005) and Yalowitz and Bronnenkant (2009).

According to Ross & Lukas (2005), research indicates a positive relation between the time visitors spend observing the elements of an exhibit and the learning produced. Hence, the more time a visitor spends at an exhibit, one expects he or she has more opportunities of learning and building knowledge from the questions, comments and inquiries that result from the messages one wants to communicate or from his/her own concerns. Similarly, if visitors do not observe, interact or read at the exhibits, it is little likely that learning will result based on them (Surrey, 1998).

First Steps: Evaluation of the Time Spent and Behavior of Visitors at the Barranquilla Zoo

The first study on time spent performed at the Barranquilla Zoo enabled exploration of the attractiveness (the capacity or force each exhibit has to attract visitors) and holding (dwell time of people) of the exhibits (animal identification label, devices) and

areas (rest, contact with animals and animal feeding), and hence implementing changes that could result in more significant experiences for visitors (FUNDAZOO, 2011). The main results of this first study allowed us to reach three main conclusions (Sierra & Olmos, 2012):

1. On average, visitors spend 111 minutes in their visit to the Zoo.
2. Talking to others and taking photographs are the most frequent behaviors in a visit to the Zoo.
3. Visitors use interactive devices more than signs that only display information.

Hence, the study resulted in the need to “provide less for more”. It was then decided to provide greater interaction in less time. In addition, the amount of information on the animal identification labels, signs and devices were reduced and, in turn, these resources were used to encourage attitudes and behaviors that promoted greater connection between visitors’ prior concepts and the messages one wants to convey through said channels. It was also concluded that a visit to the Zoo is more of a social experience than a contemplative one. Therefore, it was also concluded that group experiences and exchanges between Zoo educators and visitors should be encouraged.

Based on the conclusions, new informative signs for animal identification were designed, which purpose was to improve access, the time spent in front of them, and interactions, thus encouraging greater and better learning opportunities at the Zoo. This process favored

design criteria of animal identification label consistent with the literature associated to learning in informal education contexts, especially in museums and zoos.

Given the need to continue with the research processes and build new knowledge, the proposal was made to undertake a second study that would assess the effects of the new animal identification label on the time spent by visitors at the Zoo

Methodology

A quantitative research was conducted for seven months using the Timing and Tracking technique. The study was non-experimental, descriptive and crossover, and done in a natural context, it considered independent and dependent variables. The sample consisted of 327 subjects who were segmented based on gender and age.

To calculate the time spent at the Zoo a distribution format of the species per area was used, which had been made for the 2010 study and updated, taking into

General time at the Zoo by Area (min)			
2010 – 2011		2014 – 2015	
Area	TOTAL	Area	TOTAL
Live Museum	24,10	Live Museum	24,28
Food & Drink	15,52	Food and Drink	19,43
Africa	15,13	Africa	14,02
Rainforest	8,30	Rainforest	8,48
Herpetarium	7,07	Herpetarium	8,38
Budgie Aviary	6,00	Budgie Aviary	8,13
Pond	5,25	Pond	7,05
Rainforest 2	5,17	Birds	5,56
Farm	5,13	Marmosets and Tamarins	5,27
River	5,00	Rainforest 2	5,23
Asia	4,07	Farm	4,56
Birds	4,07	Asia	4,49
Cloud Forest	2,07	River	4,44
Marmosets and Tamarins	2,07	Primates	3,15
Primates	1,55	Cloud Forest	3,14
Night house * ¹	0,00	Night house	3,01
Entrance *	0,00	Entrance	2,27
TOTAL TIME	111	TOTAL TIME	131

consideration the changes that took place between 2010 and 2014.

The data collection stage lasted a total of four months. Three observers made records (data collection) and one additional observer took care of the replacements required during the observations. Three daily samples were collected on average, during the week and on weekends. Researchers would observe the visitor throughout his entire visit at the zoo, from arrival through exiting and, subsequently, would input the data in the WorkStudy +5 program.

Results

As to the time spent by visitors at the Zoo (per exhibit, area or activity performed), when compared with the previous study, we found significant differences in time spent per exhibit, area, and activity performed invested by visitors. The foregoing was determinant on the 22 minutes increase (approximately) in the total time spent at the Zoo.

Table 1 shows that average time at the Zoo in 2014-2015 is of 131 minutes, underscoring the average time per Area, which is 8 minutes. On the other hand, with respect to exhibit attractiveness differences were found both in dwell time and in the position held by the first five species. eg. tigers having 4 min 6 secs in 2010-11 and 4 min 49 secs in 2014-15

Regarding the time spent with the new labels, we found out that the label with longest time is the tiger, with 40 seconds in total; representing 14% of the time a visitor stays at the exhibit. Likewise, during that time there are an average 22 interactions per visitor. This means that with the tiger animal identification label eight of the nine possible behaviours with the label happened.

According to the above, the number of general average interactions with the animal identification label is 16 interactions. The label with the higher interaction average is the jaguar (*Panthera onca*), with 31 interactions per visitor. This indicates that even though there is a relation, the number of interactions is not directly proportional to the interaction time.

Finally, there were 5431 behaviors with animal identification labels, among which "observe" had the highest number (1872), followed by read (1809). While actions such as using the QR code (that the animal identification label has), lead to only two interactions only. (The nine possible behaviors are listed in the table above right).

Discussion & Conclusions

Visitor studies show a route or plan to undertake actions that are aimed at improving visitor experiences from a cognitive, social and emotional standpoint.

Considering the data found, it is possible to draw

Relation of behaviors with animal identification label	
Behavior	Number of interactions
Observe	1872
Read	1809
Interacting/Manipulating	968
Reading to someone/Reading out loud.	657
Taking picture or video	42
Following instruction	36
Transcribing information	32
Playing	13
Navigating- using QR code	2
TOTAL	5431

certain conclusions about the visit, animal identification labels, exhibits, and visitor characteristics.

Furthermore, one can identify how the changes made based on the prior Timing & Tracking study results had a significant impact on the time spent and experience of visitors at the Zoo and to compare them with theories or studies in similar contexts.

The results obtained enabled a better understanding of visitors. What they do. What they like. Where they go and how much time they take, are questions that allow us to identify elements that foster significant experiences of visitors during the time spent at the Zoo.

Hence, one of the most important findings is that visitors prefer to see exotic species. We find that exotic animals overall, have greater attractiveness than endemic animals (exclusive of one region in Colombia) and native animals (that can be naturally found in the country.) Similarly, one finding that is not surprising is that large animals are of greater attractiveness to visitors and receive greater attention than smaller animals (Bitgood and Benefield, 1987; Ward et al, 1998 quoted in Francis, Esson and Moss, 2007); this is reflected in comparisons of the time spent per exhibit.

Contrasting with this, we find that interactive devices such as the new animal identification labels or other devices present in the exhibit have an important impact on the general public because they are attention-catching and promote multiple benefits relating to learning, entertainment and group activities that bring families together (Brody, 1981; White and Marcellini 1986 quoted in Clark-Ridgway, Livingston and Smith, 2005). To the same extent, considering the text and images (Brennan, 1977 and Serrel, 1977) in the design of the new animal identification label and other devices, fostered greater learning experiences for visitors, a larger number of elements explored within the exhibit and a significant increase in time spent by visitors inside the zoo (Derwin and Piper, 1988 quoted in Clark-Ridgway, Livingston and Smith, 2005).

The most common actions by visitors with the animal identification label include observing, reading and

manipulating (making them turn; using them). This is consistent with the purpose of an exhibit device. On the other hand, actions like reading out loud of the information on the sign was more common than photographing it or following one of its instructions; however, elements like the use of QR codes are not taken into account by visitors.

Lastly, Timing and Tracking studies enable an understanding of visitor behavior and enriching their experiences, considering that their needs and expectations are more aligned with their experience based on changes made as a product of the results of such studies. Further studies will be set in motion in the future with the purpose of assessing visitor experiences, not only in quantitative terms but also in qualitative terms.

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Family Conversations at an Orangutan Exhibit: The Influence of Zoo Educators

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Abstract

One of the primary audience groups visiting zoos are families; therefore, understanding the conversations that occur within family groups is important. In order to define the importance of visitor/staff interactions, we used sociocultural theory as a lens to explore the conversations that occurred within family groups and between family groups and zoo educators. Using a Zoo Conversation Observation Record, we recorded data from 102 families and compared the data to determine if conversations with staff influenced the conversation topics. Our findings indicate that the conversations with zoo educators increased the mention of threats to biodiversity, palm oil, conservation, and behavior.

Introduction

One of the primary audience groups that visit zoos are families, which by default makes them an important group for evaluation. Understanding how families interact within their group and with staff through conversations at an exhibit can aid informal institutions with the development and delivery of conservation messages (Patrick, 2014; Smith, Broad, & Weiler, 2008; Uzick, 2015). Family groups are an important compass for defining the impact of zoo programs, because parents identify zoos as places for social family interactions and teaching their children about nature (Hallman & Benbow, 2007; Patrick & Tunnicliffe, 2013). More importantly, for zoos, a family's culture shapes how they experience a zoo visit, driving which activities they do, the order in which they do activities, and who, what, and how they choose to interact while doing the activities. Sanford (2010) found that familial behaviors could be used as indicators of family learning potential. Therefore, the study presented here analyzed conversations among family groups that did not interact with staff and family groups that did interact with staff. The study took place in an orangutan exhibit at the Chester Zoo (England) and collected data from family groups before, during, and after interactions with a zoo staff member to determine in what ways the staff member influenced the conversations.

Theoretical Framework

Based on sociocultural learning theory, learning occurs during the social interactions that an individual has with members of its cultural group (Rogoff, 2003). In the case of family groups who visit a zoo exhibit, the learning that takes place is socially mediated, with an individual's learning experience being shaped by contributions from their family members and/or an interactions with a zoo staff member (Sanford, 2010). These social interactions then shape the family's learning experiences (McClain &

Zimmerman, 2014; Rogoff, 2003). The family groups in this study interacted culturally and socially within their group and with a member of staff at a zoo exhibit that focused on orangutans, conservation, and sustainable palm oil products.

Methodology

Participants

The participants for this study were two clusters of family groups ($N=102$), defined as at least one adult with one or more children appearing to be under the age of seventeen, who visited an orangutan exhibit at Chester Zoo in summer 2014. The family groups were chosen through a convenience sample of next available family group. Cluster A included 80 groups that visited the exhibit without staff interaction. Cluster B consisted of 22 groups that interacted with a member of the zoo's education staff. The staff/visitor interaction took place at a palm oil cart where the education staff presented visitors with biofacts and manipulatives about palm oil products, threats to biodiversity, and conservation.

Data Collection

Data was collected from each family group by following the group through the exhibit and recording their conversations on a Zoo Conversation Observation Record (ZCOR). The ZCOR, developed from similar conversation observation records (Patrick, Matthews, & Tunnicliffe, 2013), was a pen and paper approach to recording conversations. The ZCOR included 14 topics of conversation and was designed to take into account the exhibit interpretation and the topics education staff members discussed when interacting with the participants. The visual and verbal interpretations included threats to biodiversity and palm oil. The conversation recordings began when the family entered the exhibit and ended when the family exited the exhibit (Patrick & Tunnicliffe, 2013). The researcher listened to the group conversations and made a tally mark in the corresponding category each time the group mentioned that topic. This allowed the researcher to

Topic of Conversation	Definition of Topic	Example of Topic from Conversations	Cluster A Total Visitor to Visitor	Total Visitor to Visitor	Visitor to Visitor Pre-Cart	Cluster B Visitor to Staff at Cart	Staff to Visitor at Cart	Visitor to Visitor Post-Cart	Number of times Cluster A (N=142 comments) and Cluster B (N=230) mentioned each topic of conversation. N=372, the total number of times the topics were mentioned.
Behavior	Natural actions of orangutans, which may be in the wild or in the exhibit.	<i>It is running. It is looking at me. It is scratching.</i>	142	34	17	25	42	17	
Conservation	Ways in which humans aid orangutans or protection of habitat. Status in the wild.	<i>These are endangered. The zoo helps protect them.</i>	0	0	0	17	34	0	
Habitat	Description or mention of where orangutans live in the wild.	<i>These live in Sumatra</i>	0	6	0	0	0	6	
Palm Oil	Mention of palm oil.	<i>What is palm oil? Where does it come from? Palm oil is used in all kinds of household products.</i>	0	0	0	17	36	0	
Threats to Biodiversity	Dangers to biodiversity that stem from human influence.	<i>People are burning the rainforests to make room for farm land. Humans are the reason behind global warming.</i>	0	0	0	8	11	0	
Total			142	40	17	67	123	23	

determine the focus of the group's conversation and how often a certain topic was discussed. Even though the ZCOR collected data on 14 topics of conversation, this article focuses on the five topics covered by the exhibit interpretation and education staff members: Behavior, Conservation, Habitat, Palm oil, and Threats to Biodiversity. See Table 1 for definitions of these topics and examples of discourse that was coded.

Results

Table 1 presents the total number of topic comments for Clusters A and B and separates the data for Cluster B into visitor pre-cart interactions, staff/visitor interactions at the cart, and visitor post-cart interactions. The following sections report the results for each cluster.

Cluster A

Cluster A made 142 comments. Of the five topics covered in this paper, Cluster A mentioned only behavior (100%) and the behavior comments focused on the behaviors that were occurring in the exhibit not those that occur in the wild.

Cluster B

The total number of comments that occurred in Cluster B was 230. This number includes the comments that were mentioned pre-cart, visitor to staff at cart, staff to visitor at cart, and post-cart. When the data were separated by groups, the results showed that 53% of the 230 comments were made from staff to visitor followed by 29% from visitor to staff. Similar to the Cluster A results, Cluster B mentioned behavior most often, but the presence of a staff member increased the percentage of behavior comments. Prior to

remained at 7% after the cart. However, during the cart interactions, the number of behavior comments visitor to staff increased to 11% and to 18% staff to visitor. Additionally, comments concerning threats to biodiversity, palm oil, and conservation occurred only during the conversations with staff. The few habitat related comments (3%) were made post-cart.

In summary, our results allow us to categorize the conversations of family groups into no interaction with staff, interactions with staff, and post staff interactions. Cluster A (no staff interactions) and the pre-cart interactions of Cluster B were similar in that they only mentioned behavior topics. The increase in the number of comments including biodiversity, palm oil, and conservation were directly related to the interactions Cluster B had with staff at the palm oil cart. Family groups expressing an interest in these topics appeared to be motivated by the staff. During the cart interactions, the staff did not mention habitat, which was a part of their cart presentation.

Conclusions

In alignment with previous studies (Kopczak, Kisiel, & Rowe's, 2013; Patrick, 2014), our results indicate that the presence of staff and their introduction of topics related to the orangutan did influence the conversations of groups. However, as the results show the topics of conversation did not continue after the staff interactions. Conversations are a powerful way to elicit interactions among family members and between visitors and staff. Conversations can set the scene for the exhibit and allow visitors to make predictions about the organisms and exhibit, ask questions, declare puzzlement about the organisms, and express their feelings (Patrick, 2013).

However, based on the findings of this study, the conversations among family do not continue to focus on the introduced topic. The purpose of this time with staff is to aid visitors as they make sense of their ideas about the organisms and the intended zoo message. Zoo educators cannot give the visitor understanding, the visitor must come to the understanding through their prior knowledge, comfort with the topic, readiness to explore the topic, and personal interest. Zoo educators can motivate visitors by being interesting, excited about the topic, passionate, and knowledgeable. Conversations can bridge gaps between the visitor and the message the zoo educator and the exhibit intend. The finding that the social interactions between families and zoo educators influenced the science related conversations that occurred is important. As Rogoff's (2003) sociocultural perspective shows, zoo educators should extend the science related conversations by asking thought provoking questions (Patrick, 2014) and providing the families a chance to share their knowledge and experiences.



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Figure 1 (left). Family Group in Cluster A taking photographs of the orangutans.

Figure 2 (below). Cluster B interacting with a zoo educator at the palm oil cart.



Gaining Knowledge and Changing Attitudes Following Interactive Experiences at the Attica Zoological Park, Greece

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Introduction

Effectively promoting pro-environmental behavior in zoo visitors and the wider community should be of utmost priority when formulating the educational strategy of a Zoo (WAZA 2005, EAZA 2008). As is laid out in Kollmuss and Agyeman (2002), many conflicting and competing factors may influence people's decisions toward pro-environmental behavior and not one model can incorporate all the factors but when different factors act synergistically there can be the biggest positive influence. Of several factors identified we are presenting results from studies measuring knowledge gain and improving attitudes in our zoo-visitors following interactive interpretive experiences at our Park.

Visitor Learning Agenda & Knowledge Gain

Attica Zoological Park (AZP) provides a multitude of interpretive tools for our ~450,000 visitors annually including information panels, hands-on interactive sessions, guided tours and keeper

presentations. Our studies show a slightly skewed gender ratio with more female visitors (F:M = ~1.5) with 31-45 year olds being the most represented age group (i.e., 74% of visitors surveyed excluding school groups). Typically 7 of 10 visitors surveyed were repeat visitors.

Recent studies that AZP participated in, as well as our own unpublished data, demonstrate that over 70% of visitors come with a learning agenda, even if it is only to learn the name of the species, and that the high majority believe that the utmost priority of zoos is to be a place where people can come to learn about animals and their conservation (Roe et al., 2014; Roe & McConney, 2015). Non-AZP-visitors also hold these beliefs (unpublished data). It is thus essential to provide sufficient and interactive interpretive experiences (*see photos*) which are known to have a strong influence on visitor learning (Rajecki 1982 and references therein, Vischer et al., 2009, Weiler & Smith 2009, Pearson et al., 2014). Indeed, an AZP visitor study of knowledge gain (e.g., geographic distribution, morphology, diet and conservation) regarding the Pygmy Hippopotamus (*Choeropsis liberiensis*) showed a significant increase in the percentage of correctly answered questions (or knowledge gain) when visitors participated in the keeper presentation rather than just reading, in part or whole, the panel (Spyres et al., 2014).





Before (above)

After (below)



Changing Visitor Attitudes with Interactive Experiences

With interactive experiences in mind, we chose to explore how the free-flight Birds of Prey presentation (BoPP) at the AZP (*photos above*) may impact visitor attitudes. The BoPP lasts ~20 minutes with up to 200 visitors seated in an amphitheater while avian trainers and educators fly owls, hawks, vultures and eagles.

and provide information on morphology, behavior and conservation. Assuming that a component of attitudes refers to the beliefs, thoughts and attributes that we would associate with something in particular (Breckler, 1984), we requested of visitors to spontaneously provide three words when thinking of birds of prey. Word clouds were created to explore attitudes in those that had never participated in the BoPP (*before, figure top*) and those that had (*after, figure below*). The most commonly quoted word in visitors *before* was “Talons” whereas *after* it was “Beautiful”. Words were then categorized into neutral (e.g., relating to biology), negative (e.g., emotional responses such as terror) and positive (e.g., emotional responses such as awe) and percentages of the total were calculated.



Table 1 shows the difference between those categories in before and after. Visitors that had never participated in the BoPP, showed that though naturally in awe of this group of birds, they were largely focused on their special adaptations (e.g., talons, beak, feathers) while less than 1% referred to conservation issues. Only a small percentage reacted emotionally and both negative (e.g., terror) and positive (e.g., beauty) responses were equally presented. However, following the BoPP, the percentage of positive attitudes increased by three-fold while neutral and adaptation-focused responses decreased. However, the percentage of negative attitudes was largely maintained and reference to conservation issues continued to be minimal.

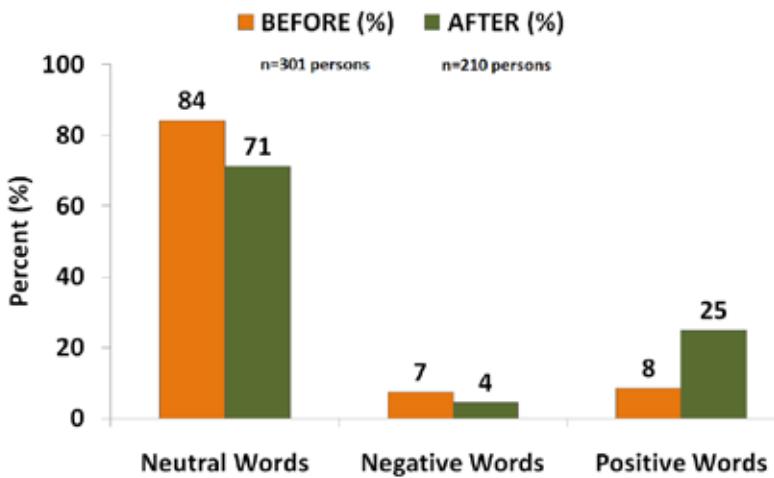


Table 1. Comparing words before and after

Changes to our story-telling approach were adopted to increase the conservation impact of our message, especially for vultures, incorporating more elements of drama to visually demonstrate the threats, and a re-evaluation study is being carried out.

It is of interest to note that preliminary data from a similar survey conducted at the Dolphins presentation at the AZP did not demonstrate a significant change in visitor attitudes, most likely due to the fact that dolphins are already a well-loved group of animals. These different findings accentuate the fact that results from one interactive experience cannot be extrapolated to another and there is a need for measuring specific impacts following each interactive experience offered. This should assist in designing more a more effective educational strategy tailored to the zoo visitors.

Conclusions

The above aims to demonstrate the importance of:
a). Providing interactive experiences as tools for zoo visitors to fulfill their learning agendas and educational expectations and to help them improve their attitudes toward wildlife and conservation, b). Measuring in a robust scientific way the impacts of each specific interactive experience provided to determine what works and what needs changing to achieve the above in order to enable pro-environmental behavior.

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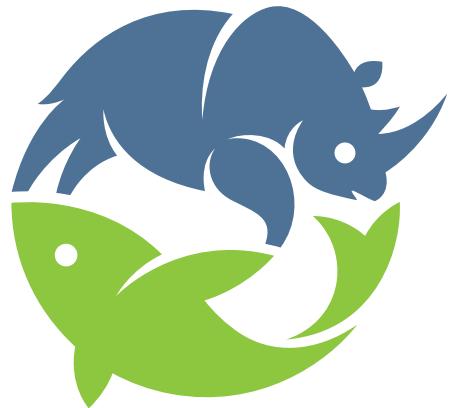
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