

ize

INTERNATIONAL ZOO
EDUCATORS
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The IZE is an association dedicated to expanding the educational impact of zoos and aquariums worldwide.

Vision: Conserve global biodiversity through effective zoo and aquarium education programs.

Mission: Engaging our members worldwide to achieve biodiversity conservation by encouraging sustainable behaviors in people that visit zoos and aquariums.

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Cover photo: School children participating in the Chimpanzee Trust supported Music, Dance & Drama Schools Competition, Mukono District, Uganda. See article page 10-11

From the IZE President, Isabel Li

Director Discovery & Education, Ocean Park, Hong Kong



With ever-changing ways to communicate in the fast-paced society, the International Zoo Educators Association (IZE) Journal remains one of the favorite deliverables among IZE members. The key people behind this success are our IZE Journal Editors. They have put in tremendous efforts collecting, selecting, and reviewing good quality articles from around the world. On behalf of the IZE, I would like to thank all past and current Journal Editors, and particularly to Mr. Stephen Woollard, for their talent and courage in taking up this challenging and tedious task. Stephen has contributed many precious hours to the IZE. He was the Secretary from 2001 to 2002, and rejoined the IZE Board as Journal Editor since 2013. It is very largely through his immense effort and tenacity that the past few issues of the IZE Journal have an extended international reach, with articles from Australia to Uganda, from India to United States, and from Germany to Hong Kong China. This truly reflects IZE is an international organization connecting educators from seven regions on six continents.

In this journal, we could find articles linking to the Aichi biodiversity targets, relating to different target audiences and also on evaluations, which are hot-topics in zoo and aquarium education. Carry the hardcopy or digital IZE Journal with you in your daily commute or treat it as a bedtime read. I am sure you could find something that you have not heard of before or something inspirational for your future educational programs.

There is an old saying in Chinese – 薪火相傳 (pass the flame). After carrying this flame for four years, Stephen would be passing it to Ms. Judy Mann. This is also the first time IZE has a Journal Editor from the African continent. I want to thank Ms. Judy Mann for succeeding the great works from Stephen, and she is going to further develop IZE's ability to evaluate and identify the best practices in zoos and aquariums education. Working together with the Website Editor, Social Media Editor and the rest of the Board, we are going to take IZE's communication to another level so to achieve our mission of "engaging members worldwide to achieve biodiversity conservation by encouraging sustainable behaviors in people that visit zoos and aquariums".

Isabel Li, IZE President



*Delegates at the 2016 IZE Conference, Temaikken, Argentina.
IZE's next conference is in October 2018, Al Ain, United Arab Emirates.*

Editor's note: Thanks go to Rachel Bergren and Judy Mann-Lang for their excellent job in proof-reading the final copy of the journal and to the IZE Board for sourcing articles.

Terminology and language - English is used throughout and special thanks go to authors for whom English is a second language. Spelling used is primarily standard 'Oxford English', however, American spellings are also used, so for example, both 'programme' and 'program' are used.

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From the IZE Editor, Stephen Woollard

This is the fifth and final IZE Journal that I have been responsible for producing. It has been a privilege and pleasure to serve the membership of the Association and to have made a small contribution to sharing ideas, development of educators, and promoting the profession by being your editor.

The 2017 Journal is packed with articles from all across the world and this year it was a harder job than ever to choose the articles to feature, edit articles, and then design and create the journal. I am delighted to report that IZE is looking into publishing articles not only via the journal but also online in the future. And don't forget past issues of the journal are available on the website www.izea.net

This year, perhaps more than ever with the political situation in many places, there is a real challenge to communicate conservation and science and engage the ever increasing human population in a wise and sustainable relationship with nature. Many of us could feel we are not making any real impact or that our work with local audiences is insignificant on a global scale. However, I am reminded of the words of Lao Tzu: ***“A journey of a thousand miles begins with a single step”*** and that together we do make a difference because we have set out on the journey and recognised that as Dame Jane Goodall says: ***“What you do makes a difference, and you have to decide what kind of difference you want to make.”***

The traditional approach to 'zoo & aquarium education' - providing stand alone lessons for schools for example, will always have its place, and the opportunity to see, smell and hear 'exotic' animals from across the world in itself is significant. However, the real impact and potential of our work is in engaging the emotions, the senses, and positive stories, to promote relevant and local behaviour change and action to appreciate and live in harmony with the environment around us.

Over 30 years ago I met Gerald Durrell (author and founder of Jersey Zoo) and took my first step on the journey and after several bends in the road, some uphill struggles, but some amazing opportunities and activities later, I find myself largely outside the 'zoo world' and in the real world, committed to enjoying and appreciating the native plants and wildlife close to me and connecting with people to share that passion and excitement of seeing a beetle, watching bees visiting flower after flower, standing in awe at the sight of an old oak tree and enjoying the health benefits of walking outdoors in nature.

As an international association, IZE brings together a diverse and passionate group who, as demonstrated by many of the articles in this journal, are making a real impact and difference in their local (and sometimes wider) community. My hope for the future is that we talk less of zoos and aquariums, and more of wildlife and nature and our responsibility and enjoyment of the world in which we live.

Stephen P. Woollard, www.ZooStephen.com, Editor IZE Journals 2013-2017



Introducing the new IZE Editor, Judy Mann-Lang

IZE is delighted that Judy has agreed to take on the challenge of becoming our new editor

Judy has been with the South African Association for Marine Biological Research (SAAMBR) in Durban since 1992. She started in the Sea World Education Department, which she ran for almost 10 years, she was then the Director of uShaka Sea World for 10 years, through the amazing years of building and then moving from the old Durban Aquarium to uShaka Sea World. After two years as the CEO of SAAMBR she returned to her passion for conservation and she is now the Conservation Strategist of the Association. She has recently completed a PhD through the University of Queensland in Australia where she investigated how best to inspire visitors to care for the environment. Judy currently serves on the Executive Committee of the Pan-African Association of Zoos and Aquaria (PAAZA).

Please refer to the website www.izea.net for instructions on how to submit articles for the 2018 journal.

Evaluating students' learning from a zoo based unit of work

Ben Liu

Learning Engagement Manager, Zoos Victoria, Australia

Abstract

Following the implementation of a range of new education programs across Zoos Victoria that better aligned to the conservation priorities of the organisation, this study responded to a well identified need to better understand and measure the impact of education programs to ultimately assess their success as a strategy for achieving organisational mission (Heimlich, 2010). In doing so, it also aimed to trial both an evaluation method that measures changes in student attitudes and reported behaviour beyond the site visit, aspects that have traditionally been notoriously difficult to measure (Ballantyne and Packer 2009).



Introduction

For approximately 40 years Zoos Victoria's education model consisted of school classes rotating through a specially designated area of the zoo, affectionately known as the Zoo School. A key feature of this approach was the delivery of 45-minute scripted lessons focusing on key science curriculum areas. While this model served Zoos Victoria and visiting schools exceptionally well, it did not explicitly address the zoo's wildlife conservation mission and feedback suggested that the traditional Zoo School approach no longer represented best practice in education. To address these shortcomings, Zoos Victoria redesigned their education model across 2014. The new model aimed to empower students to undertake actions that positively impact wildlife locally and internationally through Zoos Victoria's conservation campaigns.

Prior to the new programs, education traditionally focused on iconic endangered species (e.g., gorillas, tigers, and orangutans). By aligning to the conservation mission of Zoos Victoria, education programs are now more focused on 21 locally endangered species that Zoos Victoria is working to protect. As a result the educational offerings at Zoos Victoria now closely aligned to Zoos Victoria's Wildlife Conservation and Community Conservation Masterplans, bringing the biological and educational streams of the zoo together under the banner of Education for Conservation.

In line with the findings of Johnson et. al (2016), prior to the new Education for Conservation program the majority of evaluation efforts focussed on participant satisfaction surveys administered directly after the delivery of a program to participating teachers only.

Methods

One of the methodological aims of this study was to investigate changes in understanding, attitudes and behaviour beyond the site visit by utilising a method that enabled participant follow-up 12 weeks apart and in the hope of therefore providing a more realistic assessment of the program impact (Ballantyne and Packer, 2009).

Survey Instrument

To capture changes in students' understanding, attitudes and behaviour the study drew upon a repeated measure design with a mixed-methods survey delivered prior to and post involvement in the zoo based unit of work. In order to cater for varying school needs the survey was available online as well as in paper format. Pre-unit surveys were delivered in the first week of school term, whilst post-unit surveys were delivered in the first week of the following school term.

Sampling

The criteria for participation in this study was schools that;

- had not visited Zoos Victoria for at least 4 years,
- were using their visit as part of a unit of work (as opposed to a recreation visit),
- are a primary school (5-12 years old) booked into the Melbourne Zoo Middle Years program.

Twenty schools were invited to participate with 13 taking up the opportunity. As part of their visit each of the schools was provided with online teacher resources, a teacher web conference and a student web conference with zoo staff (resources available to any school visiting Zoos Victoria).

Data Analysis

Paper-based surveys were entered into the online survey platform by Zoos Victoria education staff verbatim and once collated with the online responses were coded according to established criteria for what constituted a correct, partly correct or incorrect answer. Pre and post-unit survey results were then compared and analysed by Zoos Victoria education staff. In total 381 pre-unit surveys and 367 post-unit student surveys were compared.

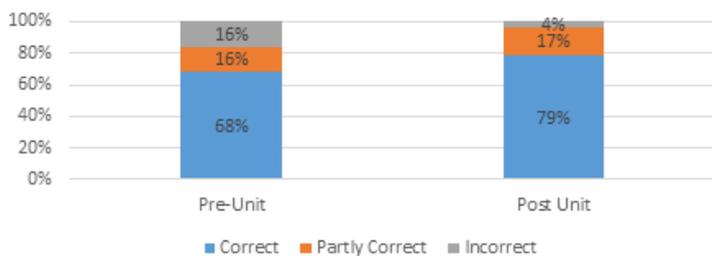
Results and Discussion

Defining the term 'endangered species'

- Participation in Education for Conservation increases participants' understanding of the term 'endangered species'.
- The majority of students has a strong understanding of the term 'endangered species' prior to the program.
- Post-unit responses demonstrated a stronger contextual understanding of the term 'endangered species'.

The quality of pre-unit responses indicated that students had a solid understanding of the term 'endangered species' before undertaking this unit, with 68% of students correctly defining the term (Graph 1.). This is not a surprise as the majority (50%>) of students undertaking this unit were in year 6 and would likely have already studied aspects of 'endangered species' prior to year 6.

What does *Endangered Species* mean?



Despite this solid pre-unit base understanding, post-unit results indicated an increase in correct responses, up 11 percentage points to 79%. This increase in correct responses was made up for by a significant decline in the number of incorrect responses which fell from 16% pre-unit to 4% post-unit. The number of partially correct responses stayed relatively the same at 16% and 17% pre to post unit. This data demonstrated that participation in the program lifted overall comprehension of the term 'endangered species' for the student cohort.



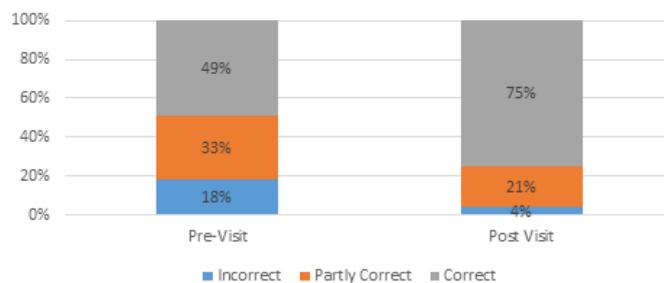
Whilst overall understanding of the term 'endangered species' increased over the course of the program, interestingly so too did the contextual understanding of students in explaining the term 'endangered species'. In pre-unit responses 29% of students made reference to the term 'extinct' in order to explain the term 'endangered species' where as in post-unit responses

42% of students referenced the term 'extinct' in order to explain the term. Referencing the term 'extinct' is seen as improved comprehension as it demonstrated that students are able to use the term 'endangered species' in relation to common scientific understandings such as the IUCN redlist.

Naming and endangered species and why it is endangered

- Participation in the Zoos Victoria education program demonstrated an increase in the naming and understanding of endangered species.

Can you name an Endangered Species and why it's endangered?



Responses to this question (Graph 2.) indicated some of the largest knowledge gains of the program with the number of correct responses increasing 26 percentage points to 75%, pre to post testing. This increase is not surprising as the program is designed to specifically profile numerous endangered species and challenge students to investigate reasons for them becoming endangered. With this in mind it is perhaps reasonable to ask why even more than three-quarters of the student participants were not able to answer this question correctly.

Having said this, it could also be argued that the 4% of the participants who submitted incorrect responses post-unit is an appropriate level of tolerance, particularly as this number had dropped by 14 percentage points from pre-unit tests. In addition, whilst 21% of students submitted partially correct responses in the post-unit survey (a drop of 12 percentage points from pre-unit) 39% of these partially correct responses are

due to two key reasons:

- The program profiled Australian Fur Seals for a particular campaign and it may have been assumed by students that this automatically meant that these animals were endangered.
- Students mixed up reasons for species being endangered. ie. Orangutans are endangered because of coltan mining in their habitat.

If the responses above were to be labelled as correct then that would take the overall percentage of correct responses for this question to 83%.

Correct Response Type

- Participation in the program increases student awareness and understanding of local Victorian endangered species.

Whilst initial results indicate stronger understanding of endangered species, further analysis of the responses indicated that students have become more aware of locally endangered species. In the pre-unit responses 13% of students listed a Zoos Victoria priority species whilst in post-unit responses this number had risen to 25% of responses. Based upon Zoos Victoria base line data for the Love your Locals campaign, to have a quarter of respondents referring to a Zoos Victoria priority species in response to this question is a strong endorsement of the education programs, especially given that the highest level of general public recall at Zoos Victoria has been 11%.

Priority Species by Correct Response Type

- Participants demonstrated a broader understanding of locally endangered or ZV priority species in post-unit responses.
- Tasmanian Devils were the most listed species in the correct responses provided.
- The Philippines Crocodile was the second most listed species.

The stronger understanding and acknowledgement of Zoos Victoria's priority species then led to further investigation of which specific priority species were being referenced. Results indicated that post-unit there is a broader recognition of Zoos Victoria's priority

species than pre-unit (Graph 3). Of the 13% of pre-unit responses that listed a Zoos Victoria priority species all of them referred to the Tasmanian Devil (*Sarcophilus harrisii*). In post-unit responses the Tasmanian Devil still tops the list of correct responses, although this time at only 34% of responses, with the Philippines Crocodile (*Crocodylus mindorensis*) second - 23%, followed by the Lord Howe Island Stick Insect (*Dryococelus australis*) - 6%, Southern Corroboree Frog (*Pseudophryne corroboree*) - 4% and Baw Baw Frog (*Philoria frosti*) - 3%.

Attitude changes to wildlife, conservation and science

Participation in the Education for Conservation program has demonstrated positive shifts in pro-conservation and pro-active attitudes (Graph 4). The most significant shifts appear to be around students' ability to see themselves as active citizens and able to make a difference to protect and save endangered wildlife. This is an important success of the Education for Conservation program as the program set out to build upon the 'usual' endangered species unit of work, which traditionally have focused on wildlife knowledge, and engage teachers and students in becoming active conservationists. The fact that program participants now demonstrate a significantly increased belief in their impact on wildlife as well as belief to become more wildlife friendly is testament to the new direction of the education programs at Zoos Victoria.

Undertaking action

Students were asked to consider a number of pro-conservation behaviours and indicate how often they participated in each of the stated actions. Results (Graph 5) indicated that student participation in most (71.4%) of the stated behaviours increased with one (14.2%) remaining the same and one (14.2%) decreasing between pre and post unit surveys.

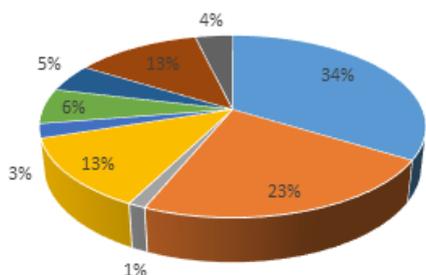
The most significant increase in pro-conservation behaviour was in mobile phone recycling which is linked to the Zoos Victoria They're Calling on You campaign. The only decrease recorded was in general recycling at home, this was also one of smallest shifts in behaviour indicators.

Generally responses to the behaviour questions indicated positive alignment with Zoos Victoria's community conservation campaigns. However it is acknowledged that that these self-reported results should only be considered indicative and are not without limitations.

Conclusion

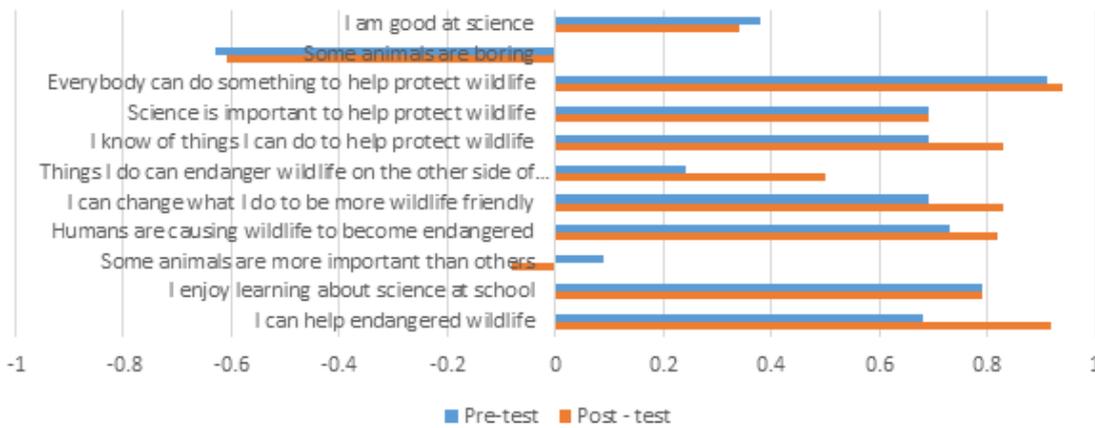
The aim of this study was to better understand and measure the impact of education programs to ultimately assess their success as a strategy for achieving organisational mission as well as trial an evaluation

Local Response Type by Species
Post-Unit



■ Tassie devil ■ PC ■ EBB ■ HeHo ■ BBF ■ LHSI ■ OBP ■ GGF ■ SCF

Attitude changes to wildlife, conservation and science



effort and was only possible because of an organisational culture of evaluation that values the significant time and energy required. The next challenge for Zoos Victoria is to extend evaluation beyond a 3 month timeline in an attempt to capture any longer-term effects of a zoo experience.

method that measures both changes in student attitudes and reported behaviour beyond the site visit.

Organisational Mission

Whilst the Education for Conservation programs across Zoos Victoria are better aligned to Zoos Victoria's mission in terms of design and delivery, results from this study suggested that program outcomes are also now more aligned to the organisational mission particularly in relation to Zoos Victoria's priority species. The next challenge for Zoos Victoria is explore more robust evaluation techniques for measuring changes in students' conservation behaviours to assist with further aligning education programs to organisational mission.

Measuring attitude and behaviour changes beyond the site

Measuring attitude and behaviour changes beyond the site visit has traditionally been a challenge for zoo education. This study tested what effort is required to deliver a repeat-measure survey up to 12 weeks apart. Whilst this study indicated that this is possible, it is worth recognising that doing so requires considerable

Acknowledgements

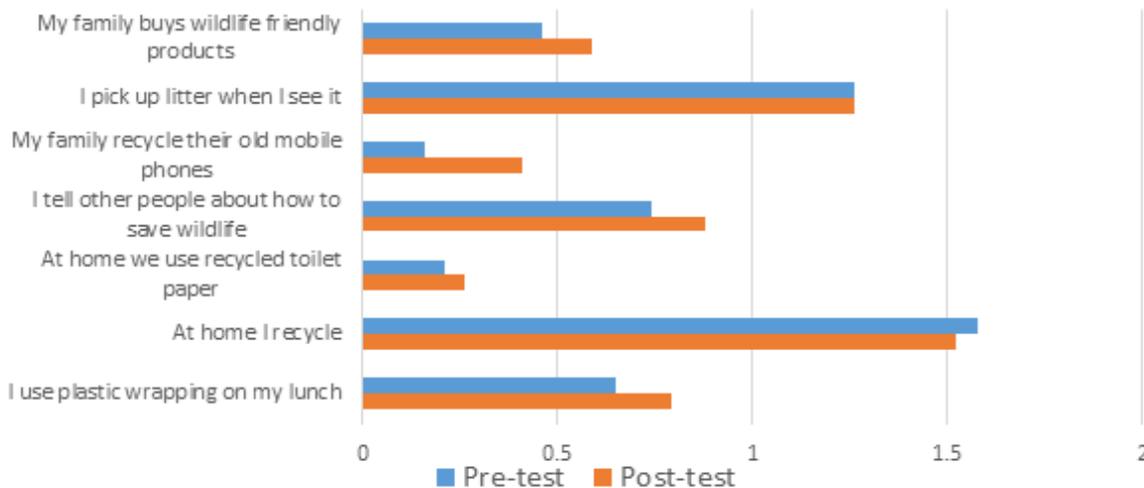
The author would like to particularly acknowledge Catholic Education Melbourne for their generous support and guidance of this study.

Corresponding author e-mail address: Ben Liu, Learning Engagement Manager bliu@zoo.org.au

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Undertaking Conservation Actions



Change My Community(CMC)

Byron Ssemambo

Primate keeper/Educator, Chimpanzee Trust, Uganda

Introduction

Chimpanzees, together with the other African Great Apes, gorillas and bonobos are endangered (CSWCT, CSCWT Strategic plan 2008 - 2012, 2008). Their range used to extend over 25 countries, but they are already extinct in four countries of West Africa (WWF, 2016). It is estimated that there are 150,000 chimpanzees remaining in the wild (Chimhaven 2016). Current trends suggest that, without strenuous efforts to conserve them, populations will decline by as much as 80% over the next 40 years. Habitat loss, snares, commercial bush meat and illegal pet trade are the key threats to Chimpanzees (Chimhaven 2016). Underlying and exacerbating these threats is a widespread lack of awareness of the value of the natural environment in general and chimpanzees in particular (CSWCT, CSCWT Strategic plan 2008 - 2012, 2008, p. 2).



Change My Community (CMC)

CMC is Chimpanzee Trust's environmental education program, designed to empower and prepare young people through imparting knowledge, values and skills that will help them conserve the world around them and enable them to become change agents in their community.

This program is in line with Chimpanzee Trust's Strategic Objective Three, which states, "Public and stakeholder appreciation and understanding of chimpanzees and environment conservation increased." (CSWCT, CSCWT Strategic plan 2008 - 2012, 2008; CSWCT, Chimpanzee Sanctuary and Wildlife Conservation Trust, Strategic plan 2013 - 2017, 2013)

Chimpanzee Trust is working with communities neighboring Ngamba Island Chimpanzee Sanctuary and chimpanzee habitat in the Northern Albertine Rift landscape to ensure the long-term protection of chimpanzees in the wild, through sensitization and education programs, provision of alternative livelihoods, etc.

Methods

Chimpanzee Trust over the years has trained teachers to integrate environmental education into the primary school curriculum. Teachers have been able

to formulate themes for the annual Music, Dance and Drama (MDD) competitions and the schools' debates and quiz competitions, in 10 island schools of Koome sub county Mukono District. This year's theme is, "Sanitation and culture".

As a result of the training, teachers train and engage children in essay writing, poems, debate competitions, School Based Enterprises (SBE), and MDD school competitions. Schools gather at an agreed venue, entertain and educate island communities through their MDD and debate presentations.

The MDD activity is a platform used to entertain and mobilize the community members into actively participating in conservation activities, such as waste management and sanitation in homes. It is also used as a platform to promote environmental awareness, skills and talent development, such as public speaking, among the young generation.

Results

We have observed an increase in the number of schools participating in our environmental education programs, from two schools in 2009 to 10 schools in 2016, in the fishing communities of Koome Island, Mukono District, Uganda.

Winning schools have been exposed to nature and wildlife centers, and as a result the children's attitudes,

understanding and participation in environmental conservation activities, such as tree planting and construction of energy saving stoves has increased.

The annual MDD event hosts about 450 to 500 community members inclusive of parents, local leaders and government officials.

Conclusion

These environmental education achievements have provided a strong platform from which to push forward and meet even more ambitious targets. We are confident that our greatest achievements lie ahead, including having all the education programmes sustainable and reintroducing some of the captive chimpanzees back to the wild to increase their populations.

Acknowledgements

1. The Chimpanzee Trust appreciates support from, Born Free Foundation through its global friend's school program which has funded the music dance and drama and other environmental education activities among the Koome Islands including; 4 teacher quarters at Koome COU primary school, tree nursery, 4 stance toilet, classroom block at Myende Community School and bee apiary.

2. Disney Wildlife Conservation Fund - The Trust also appreciates the Disney Worldwide Conservation Fund that funded the pilot phase of the change my community program in Hoima District of Uganda, a key location in the conservation of wild chimpanzee populations outside protected areas of the northern Albertine Rift in Uganda.

Corresponding Author email: byro_ns@yahoo.co.uk
education@ngambaisland.org

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How Zoo Signs Can Increase the Quality of Guest Education

Benjamin Ouellette

Senior Zookeeper, Franklin Park Zoo, Boston, MA USA; Miami University, Project Dragonfly Graduate Student

Abstract

As the development of human civilization continues to put other species and the habitats that support them at risk, it is crucial that everyone answer the call for support from every available discipline. In order to do so, people must first be made aware of the issues surrounding conservation. Zoos provide one of the best opportunities for educating the general population on conservation issues. By providing meaningful connections with animals they also foster thoughts of environmental stewardship in visitors. Zoo information signs represent a constantly available resource for visitors to learn about the animals they are viewing. This study investigates how signs found at the zoo can best increase visitors' overall knowledge base on conservation issues, as well as how they affect attitudes and behavior related to the same subject.

Today's modern zoological facilities are overall uniform in stating their purpose. Most will include at least four main themes; conservation, research, entertainment, and education (Churchman 1987), although not necessarily in that order. Entertainment will always have a place in zoos. It is the main draw for attracting visitors and provides the primary means of funding for the facility.

Conservation and research are both important aspects of a zoo's role in the modern world. These two themes solidify the unique position that zoos hold in the scientific community; the access to rare and exotic species for research purposes, combined with a specially trained staff with extensive knowledge of those animals. Participation in research and conservation projects maintains the relevancy of zoos in the modern world and allows them to contribute a great deal of knowledge towards global preservation.

The final theme of education may seem to be the simplest, but in reality, could have a greater impact than conservation or research-based endeavors. As stated by Jacobson and McDuff (1997), there is alarmingly little knowledge pertaining to how the public understands conservation issues and the mechanisms behind them. Most zoological facilities receive hundreds of visitors or more on a daily basis (Gusset and Dick 2011) (some zoos are thousands or even tens of thousands a day!), and with every visitor an opportunity for a particularly moving educational experience is possible. As referenced in Cárdenas-Torres et al. (2007), some of the most effective and long lasting efforts towards conservation start, not from enormous global organizations or government programs, but from community members who are the closest to and most affected by the issues. The unfortunate truth is, no matter how well thought out a conservation program might be, if it doesn't have a truly supportive foundation (i.e. members of the community) then it has a much smaller chance of overall success (Waylen et al. 2010). If given the

proper opportunity to be educated, it is reasonable to think that most zoo visitors on any given day could begin to implement small changes in their community, which over time could have a much larger effect on global issues. This paper extrapolates on a study that investigates how zoo signage can positively affect the education of guests. Zoos have multiple ways of providing education to the public. These sources include: strategically placed informal encounters with education staff, zoo information signs, formal educational presentations within the zoo, camps and other programs for children, and outreach programs that bring educational experiences off grounds to those who may not be able to visit the zoo themselves. While all of these methods help to reach a wide variety of people, the one thing that most of them have in common is the necessity of available human educators to facilitate the experience. Unfortunately, this requires a constant level of staffing, which not all zoos are able to provide due to funding and scheduling limitations. One source of education that all zoos are able to provide at all times are information signs. Zoo signage can affect the visitor experience by answering basic questions about the animal present, increasing the amount of time visitors spend at the exhibit, and stimulating curiosity. All could result in further exploration at a later time, as well as fostering concern for animals and their environments, which may lead individuals to become involved in conservation activities. The largest factor working against the potentially positive effects of zoo signs is the tendency for visitors to ignore them completely (Schlegel 1982). Reasons such as visitor fatigue, popularity and activity level of the exhibit animal, sign length, and level of difficulty have all been observed to affect the likelihood of visitors reading said signs (Churchman 1985).

This study focuses on the latent potential of zoo signs and how they might increase the quality of the visitor's educational experience. Also investigated are how zoo signs could be used to create a more effective educational conduit including increasing the amount of time visitors remain at each exhibit, their knowledge

of global conservation projects, and how they can become involved.

Methods

For the purposes of this study, a survey was administered at Zoo New England, an organization that consists of two sister facilities in both Stoneham and Boston, Massachusetts. Survey questions evaluated how sign placement affected the likelihood of visitors to read said signs and asked if they would be more inclined to read signs with cleverly written dialogue as opposed to listed facts.

This survey was also concerned with visitors' knowledge of and willingness to participate in conservation projects and organizations. This was based loosely on the ideas expressed in Ballantyne et al. (2007), which investigated the potential that zoos have in affecting the behaviors and motivations of visitors to become actively involved in conservation activities of any kind. The questions in this survey asked the participant to evaluate his or her own level of conservation knowledge, whether or not they would like to learn more about getting involved in global conservation, and if they would be more likely to become involved in conservation practices if species signs highlighted different ways to get involved with the animals being viewed and their environments.

Surveys were administered to visitors of Zoo New England. The decision was made to administer the surveys to visitors at both zoos physically to ensure that the results directly related to the signs belonging to those facilities and could benefit them in the future.

It was explained to participants that the purpose of the study was to collect visitor responses to questions that would in turn assist in improving the quality of the species signs in the zoos. In each zoo, the locations of survey distribution were comparable to each other. Both locations were considered areas of high traffic flow, in front of exhibits containing some of the most popular animals in each of the facilities (gorillas and black bears).

After the survey process had been finalized, the results were tallied and results from improperly answered questions were discarded. The final data was then examined and represented in the form of graphs and charts which were then analyzed for trends.

Results

The results shown in Figure 1 convey that 99% of survey respondents read the species information signs. Of that 99%, 25% thoroughly read the signs while the remaining 74% scanned them briefly. If the signs were presented in a more interactive way, 33.6% of visitors confirmed that they would be more likely to read the signs in this format, while 58.4% said that the new format would possibly increase the chances of

Fig 1. How Thoroughly Visitors Read Species Signs

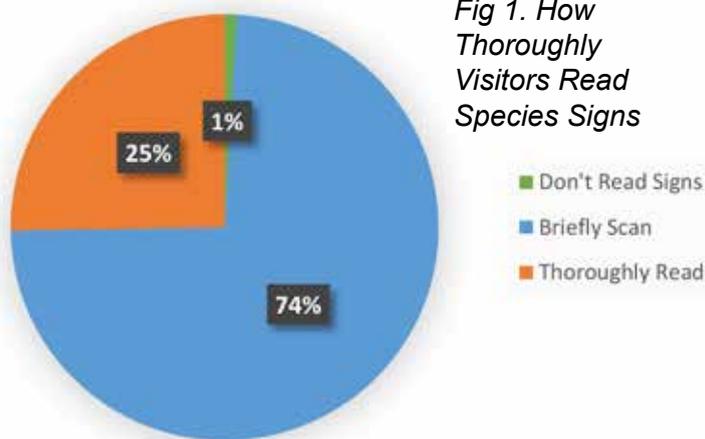


Fig 2. Likelihood of Visitors Reading Signs Presented in a More Interactive Way

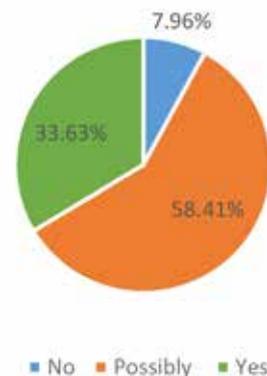


Fig 3. Visitor Knowledge of Global Conservation Issues



Fig 4. Likelihood of Visitor Participation in Conservation Activities if Species Signs Offered Easier Access

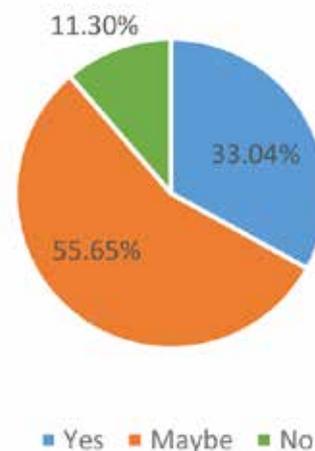
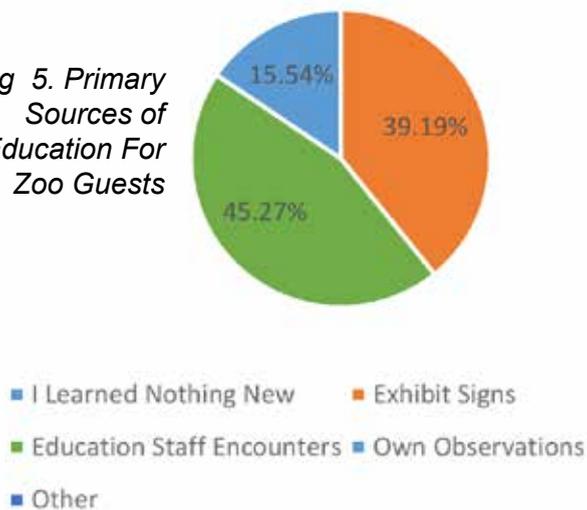


Fig 5. Primary Sources of Education For Zoo Guests



them reading the sign, as seen in Figure 2.

As seen in Figure 3, when asked to evaluate their own knowledge of global conservation issues, more than half of survey participants admitted to having minimal to no knowledge on that subject. About 29% responded that they had a fair amount of knowledge while only 5.5% evaluated themselves as having a lot of knowledge on the subject.

The data in Figure 4 suggests that a majority (~ 89%) of visitors who took the survey stated that they would be more likely to participate in conservation activities if the species signs offered a more direct connection of the visitors towards specific conservation organizations.

Although most (45%) of the survey participants selected education staff encounters as the primary source they receive knowledge from during their zoo visit, exhibit signs were the second most frequent answer with 39% of respondents choosing that as their foundation for education at the zoo (Figure 5).

Discussion

A possible benefit that manifests through the improvement of signs is an increase in conservation awareness and participation by visitors. Zoos represent an excellent opportunity to increase the public's involvement in conservation practices because they are able to offer a free choice "learning for fun" environment (Packer & Ballantyne 2004). In theory, zoos can impact a substantial change by doing just a little bit more in the field of conservation education. There is a willingness to learn and participate by visitors, or they would not be there. Falk and Dierking (2000) acknowledge that, voluntary engagement activities such as reading an informational sign, tend to leave a more meaningful impression than traditional classroom learning. The presentation of conservation activities and methods of involvement on the sign could lead to an increase in participation by zoo visitors in conservation organizations and

activities. If conservation education in zoos could reach those respondents who are currently uninvolved in the field of conservation, it is entirely possible that they might become more involved as a result.

Conclusion

This study revealed that there is not one single answer for successful zoo signs. The effectiveness of signs will change from exhibit to exhibit and what might work in one facility could completely fail in another. Therefore, all a single facility can really aim for is to have the signs effectively reach and leave as lasting an impression as possible on the largest amount of visitors.

Acknowledgements

I would like to thank Zoo New England and my fellow classmates at Miami University for reviewing and discussing this paper while drafting. This work was conducted as part of graduate work through Project Dragonfly at Miami University in Oxford, Ohio.

Corresponding Author Benjamin Ouellette, ouellebd@miamioh.edu

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How to evaluate environmental education actions at the zoo?

The experience of São Paulo Zoo (Brazil)

Kátia G. de Oliveira Rancura, Camila Martins, Aparecida Amaro, Wesley Tadeu, Caio H. de Araújo-Bissa, Nathália Formenton and Rafael Zanetti

São Paulo Zoo - Brazil

How can we evaluate all the educational actions that are developed in a zoo? In what way can we understand whether our actions met their goals? How to evaluate a punctual and short-term educational action?

These questions emerged in the routine of the educational team of São Paulo Zoo in 2013, when we felt the need to reflect in depth on the results achieved in all activities of the Environmental Education Program. Therefore, as a way to allow the study of educational research and practice, we created a Research Group on Environmental Education in Zoos with the aim of conducting theoretical studies on the environmental education research field as a way to enable the preparation of instruments that could be applied to the environmental education actions. This article will present an account of the experience developed by the educators of the São Paulo Zoo when analyzing all the activities of its Environmental Education Program: six guided visits, two educational spaces, two didactic presentations, a social inclusion program for the elderly, two teacher/educator training programs and a social media.

Introduction: Zoos have undergone a great evolution in the last century. From leisure spaces, these institutions have become important centers for conservation of fauna. Since they receive millions of visitors annually, Zoos have great potential for the development of educational activities, contributing to reconnect people with nature and to a different way of learning about wildlife and biodiversity conservation.

The São Paulo Zoo has also been evolving and adapting to the new concepts of modern zoos. In this sense, its Environmental Education Program (EEP), which officially began in 2000, has also undergone changes and significantly expanded its operations, diversifying its audience and the strategies used to reach these people. Currently, in addition to the already consolidated activities designed for the school public and spontaneous visitors, such as courses for teachers, guided visits, educational spaces and presentations, the EEP also has several activities of social inclusion and actions with communities, integrated into wildlife conservation projects in nature. Now it faces a new challenge: to combine practice with research, seeking to understand how effective these activities are, with the goal of continually strengthening and improving them, and generating knowledge that can be shared with other educators from non-formal spaces.

Creation of the Research Group on Environmental Education in Zoos

The year 2013 was marked by the beginning of a new way of understanding the educational practice and research developed by Fundação Parque Zoológico de São Paulo (São Paulo Zoo). In that year, the team of educators of the institution, with the support of collaborators, started the organization of a Research Group on Environmental Education in Zoos (GEPEAZ), whose main goal is to discuss

about theoretical and methodological references that contribute to strengthen practices developed within São Paulo Zoo's Environmental Education Program.

The formation of GEPEAZ arose from a very interesting articulation between São Paulo Zoo and Federal University of São Carlos (UFSCar), especially by the Postgraduate Program in Wildlife Conservation (PPGCFau), resulting in a partnership between the two institutions. The approach to the research developed in this Postgraduate Program, in particular, one of a master's student whose project consisted of a research about environmental education in zoos, aroused in the São Paulo Zoo's educators the interest in understanding the characteristics that surrounded the research in environmental education, in order to envision and enrich the interface between research and educational practice in the São Paulo Zoo.

Thus, in November 2013, there was a meeting that preceded the creation of GEPEAZ, whose theme was to discuss the characteristics of the qualitative research and some methodologies. Seven environmental educators from São Paulo Zoo and the master student who became the main collaborator of the group were present in the meeting. On that day, all São Paulo Zoo's educational activities were listed, and the group discussed about gaps and challenges in the field of environmental education in non-formal spaces, specifically in Brazilian zoos. As a result of this first in-depth contact with research on environmental education and reflection on the panorama presented, it was decided that it would be important to define a meeting agenda that would allow a greater immersion in the discussion of these issues. That was the time the Research Group on Environmental Education in Zoos really started and, from that point, its consolidation process began.

In these four years of operation, GEPEAZ already had the presence and involvement of several

professionals and is currently composed of seven members: two biologists from São Paulo Zoo's Education Division; two trainees also from this division; two collaborating biologists and a master's degree student from the PPGCFau (Figure 1).



Throughout these years we have reflected on the importance of creating a research group, with academic characteristics, but totally immersed in a practical and professional environment. The articulation with the university was fundamental to inspire and motivate the need for this approach to research and practice in the zoo, but the innovative character of this action is precisely because it is maintained and structured by professionals of the institution itself, who wish to produce knowledge from their practice and the structure of a zoo.

Silva (2014) has stated that “a research group is built with patience, persistent and attentive work not disturbed by the slowness of studies which are building references from life, literature, orality and social reality”, and that is formed from the experiences of each person's life and from the interest in knowledge. As discussed by Oliveira et al. (2014), educational processes in social practices can contribute to rooting, uprooting and creating new roots in each context. It is precisely in this way that we believe in the potential of a research group on Environmental Education at the São Paulo Zoo: in the capacity to glimpse new horizons to always provide the best experience to our visitors, contributing to the creation of values and commitment to the conservation of wildlife.

Group Goals

The overall goal of GEPEAZ is conducting theoretical studies on the environmental education research field as a way to permit evaluation of all educational activities developed by the team and the production of knowledge about the area. As specific objectives, the group seeks to reflect on environmental education practices through action-reflection-action; to create, develop and apply data collection tools, as well as their analysis; to evaluate the practice and relationship with the visitors; to publish articles and participate in events about the area to share the experiences and knowledge developed, contributing to the articulation between research and practice on environmental education in zoos.

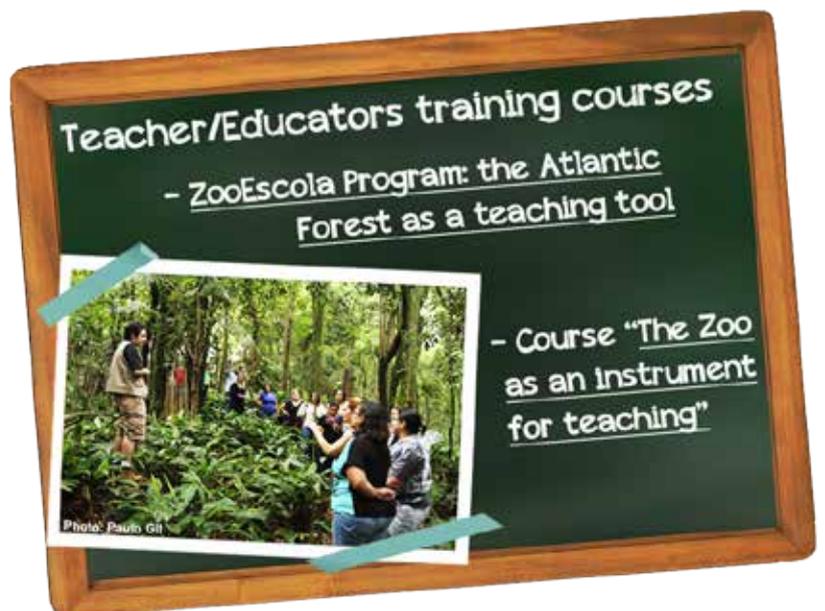
Survey of educational actions

Throughout three years of existence, GEPEAZ was focused on analyzing and revisiting the entire São Paulo Zoo's Environmental Education Program. To achieve this goal, the research group concentrated its efforts and performance in

some steps. The first one was to list all the educational actions developed by the São Paulo Zoo and to select the priority ones for the second step: the evaluation (Figure 2). After that, the process of developing the data collection instruments began.

Collecting data

During our meetings, especially in 2014 and 2015, we conducted readings and discussions on the approach and methodologies to evaluate and analyze all selected actions. Because we want to deeply understand perceptions, existing interactions and the sensory and cognitive processes present in each activity, we decided to conduct all research in a qualitative perspective, focusing on the process and not just on the final result. The research group used methods of data collection according to each type of activity developed by the zoo educators. Among these methods are: semi-structured interviews, semi-structured questionnaires, structured questionnaires, focus groups and video recordings of the developed practice. All the data were transcribed or organized for analysis using mainly textual-discursive analysis. This methodology is considered as an intermediary between content analysis and discourse analysis, and this consists in the understanding of a phenomenon from the deconstruction and reconstruction of texts from interviews, group discussions, etc. (MORAES, 2006),





through the creation of categories and their analysis.

Products

All this hard work, however rewarding, led to the publication of two articles, the first one in 2015 in the International Zoo Educators Association (IZE) Journal entitled "ZooEscola: A Teacher Training Program of São Paulo Zoo, Brazil", and the second one, in 2016, in a Brazilian journal called Revista Brasileira de Educação Ambiental, entitled "Contributions of the Environmental Education Project Clube Tetéia of São Paulo Zoo Foundation for Active Aging and Social Inclusion of the Elderly". In addition, we present our findings at the 23rd Biannual Conference of the International Zoo Educators Association and at the XVI Encontro Paranaense de Educação Ambiental (Brazilian congress).

The second product originated from GEPEAZ was the creation of the Educator Training Course "Practice and Research in Environmental Education", which provided a theoretical and practical contribution to all environmental educators of São Paulo Zoo, allowing a solid formation to create enriching and meaningful experiences for the visitors.

Finally, from this reflexive process of analysis and evaluation of all actions, an important result achieved by GEPEAZ was the design of new strategies, the reformulation of activities and the improvement of the performance of our educators, which indicates the real potential of having a research group as a part of the Zoo: the opportunity to act, reflect and propose new actions to achieve the goals of the Environmental Education Program.

Future Perspectives

Although recent, the amalgamation of research and practice has already brought significant results to São Paulo Zoo's Environmental Education Program. However, we believe that GEPEAZ still has much to contribute to make the educational activities developed in São Paulo Zoo more effective and to

understand the potential of these actions and spaces in the conservation of biodiversity and in the change of socio-environmental reality.

Therefore, GEPEAZ perspectives are the inclusion of other theoretical references and data collection instruments, such as quantitative methodologies, to complement the research that has been developed. In addition, GEPEAZ intends to develop a unified project that considers its various lines of action and interest, in order to collaborate to produce knowledge of environmental education in zoos and to improve our educational actions and programs. Another intention of GEPEAZ is to formalize its existence through its registration in the Brazilian Research Group Directory of the "Plataforma Lattes" of the National Council for Scientific and Technological Development (CNPq), an inventory of the research groups active in the country and which constitutes an efficient instrument for the exchange of information. This goal reinforces the work of GEPEAZ in sharing knowledge produced through publications and participation in events in the area, inspiring other non-formal educators to believe and invest in this very successful articulation of practice and research in Environmental Education.

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Learning in the Desert

Al Ain Zoo - Host of the 2018 IZE Conference

Afra Al Darmaki, Public Programmes Manager, SZDLC, Al Ain, UAE

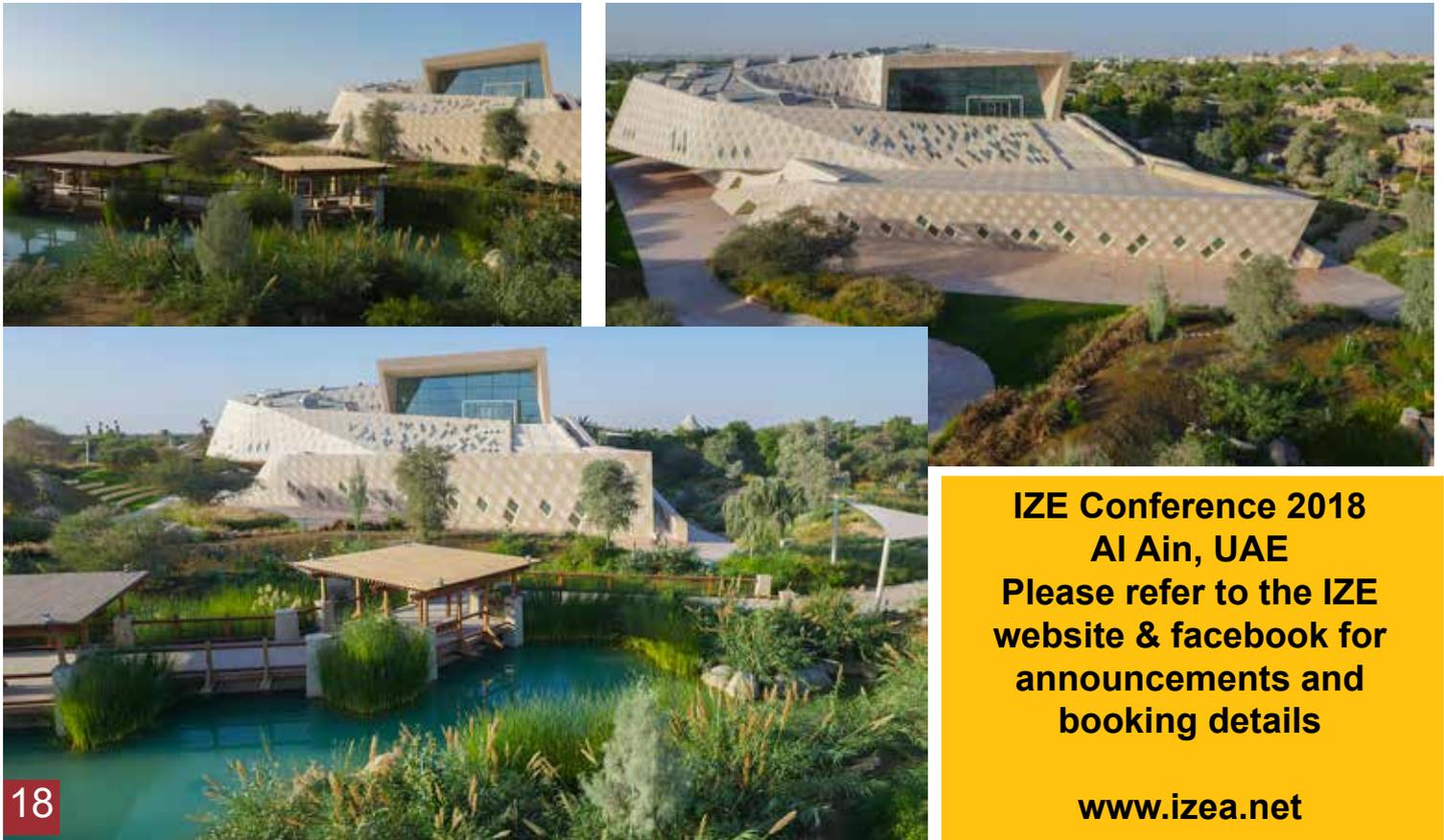
The Sheikh Zayed Desert Learning Centre (SZDLC) is the jewel in the crown of Al Ain Zoo's ambitious expansion project. It is the latest addition to educational offerings provided by the Zoo and Aquarium Public Institution in Al Ain. This hybrid facility is a cross between a science centre and natural history museum, supporting the overall vision and mission of the organization. The building is an architectural piece of art that not only is beautiful and unique but is also one of the most sustainable buildings in the world. The SZDLC is the first building in the UAE to achieve the maximum Five Pearl rating of Estidama at the design phase, demonstrating commitment to the most demanding sustainability requirements set by Abu Dhabi Urban Planning Council. Additionally the building has gained a LEED (Leadership in Energy and Environmental Design) Platinum standard.

The Sheikh Zayed Desert Learning Centre consists of five galleries that all relate to a desert theme. The first gallery talks about the founding father and first President of the UAE, His Late Highness Sheikh Zayed bin Sultan Al Nahyan. The centre was named after him as a tribute for his work in protecting the environment and celebrating the Emirati people's desert heritage.

The second gallery takes visitors on a journey five hundred million years ago to the beginning of the earth's formation and the geological changes that happened to the environment that led the Abu Dhabi desert to become the way it is today. The third gallery unveils current science and conservation efforts and the adaptations that helped plants and animals survive the desert environment. The fourth gallery shows how people in the past lived in harmony with the three environments that exist in the emirates - the oasis, the desert and the coast. The final gallery reveals information about current environmental challenges, what the UAE government is doing to encourage sustainability and finally what individuals can do to help protect the environment. The facility also contains three theatres, a café with a spectacular view to the mountains of Jabal Hafeet. All galleries are equipped with the latest technologies, interactive screens and games to promote discovery and learning. Emirati guides help visitors explore and interact with the galleries.

Curriculum-linked education programmes are offered not only in the SZDLC but also in the core Zoo, the new zoo expansion area and the Al Ain Zoo Safari. We taught over 55000 students in 2016, making us one of the UAE's biggest providers of out of school learning opportunities.

Al Ain Zoo will host the International Zoo Educators' Association Conference 14-18 October 2018.



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Taking Environmental Education beyond Zoo boundaries - How Tata Steel Zoological Park practices inclusive & holistic awareness programs

Dr. Seema Rani¹ & Dr. Brij Kihsor Gupta²

1. Tata Steel Zoological Park, Jamshedpur 2. Central Zoo Authority, New Delhi, India

Summary

Zoos have traditionally played a role as a facilitator of environmental education, conservation and biodiversity protection. However, this role they play is usually passive for the public who visit the zoo and it is only during such visits that messages on conservation and biodiversity protection is displayed to them. In addition to this, specific days celebrating Earth Day, World Environment Day, Wildlife Week, Van Mahotsava (Annual Tree Plantation Month), World Water Day, World Forestry Day etc, are celebrated within the Zoo premises where events are organized to commemorate these days and use these occasions to further amplify the message of conservation and biodiversity protection. Tata Steel Zoological Park, Jamshedpur has, however, taken this mission of environmental education to the next level by going beyond the zoo boundaries and reaching this message to the unreachable and developing innovative awareness programs to make its mission more inclusive and holistic.



Introduction

Tata Steel laid the foundation for creation of Tata Steel Zoological Park on 16th January, 1990 in Jamshedpur, India. The Tata Steel Zoological Park is nestled inside the Jubilee Park and has two wetlands on either side - the Subarnarekha River to its north and Jayanti Sarovar to its south. Both these wetlands are famous for attracting winter migratory birds. The Zoo is spread over an area of 43.25 hectares with beautifully landscaped gardens interspersed with small forest patches. Animal enclosures are positioned in such a way so as to provide visitors a feeling of being immersed in wild and verdant environment.

As part of meeting the AICHI Target-1 of the Strategic Plan for Biodiversity Conservation 2020, the Tata Steel Zoological Park has taken the initiative to make more and more people aware of the value of biodiversity by organizing various educational activities throughout the year. Events such as Earth Day, World Environment Day, Wildlife Week, Van Mahotsava (Annual Tree Plantation Month), World Water Day, World Forestry Day, Animal Welfare Fortnight, International Biodiversity Day are organized

every year and the majority of the participants include school and college students from age 5 years to 20 years – usually the primary audience for awareness programs of such institutions.

In addition to these programs, the Zoo has consciously taken on the onus of amplifying the message of conservation and biodiversity protection beyond its physical boundaries. To do this, the Zoo has developed innovative education programs to reach those people who cannot reach the zoo, and, at the same time target the primary audience visiting the zoo to take them to places which they ordinarily wouldn't reach on their own – all this to amplify the message of conservation and biodiversity protection.

Innovations & Activities

1. Residential camp for girl students on awareness of biodiversity & wildlife conservation – Tata Steel Zoological Park constantly takes the opportunity to raise public awareness about the challenges regarding the well-being of the planet and all life it supports, more so the steps youth can take to conserve and use it sustainably especially the students of schools and colleges. The Residential Nature Camp for Girl Students on Awareness of Biodiversity & Wildlife Conservation has been organized by the Tata Steel Zoological Park for the past 8 years. The objective of the camp is to promote each girl's personal development, to inspire the young women of today to become environmentally responsible and conscientious citizens of tomorrow.

Through this residential camp, where the participants camp within the Zoo premises for three nights and four days, we try to promote each girl's personal development by giving them opportunity to act on their own, be self-reliant and try things for themselves through outdoor learning in a supportive and non-competitive environment away from home. At Tata Steel Zoological Park, we believe that we have been able to inspire and make



a difference in the minds of young women of today, the inheritors of the earth, in their love for nature and the environment by providing them a self-teaching platform in the form of this Residential Nature Camp for Girl Students on Awareness of Biodiversity & Wildlife Conservation. During the Camp, students participate in a number of indoor and outdoor activities such as quiz programmes, lectures, breakaway sessions and demonstrations by subject matter experts on environment, animal welfare, wildlife and biodiversity conservation etc. The Zoo officers also organize day long experiential sessions with the students on the operation of the Zoo and provide them hands on experiences in animal management. During the Camp, the students are also taken for offsite visits to Dalma Wildlife Sanctuary where the Forest Department officials take them on a tour of the Sanctuary and highlight the need for wildlife conservation, efforts being undertaken by them and how the youth of today can contribute towards the cause of wildlife and biodiversity conservation. In addition to this, the students are also taken on a visit to the Sanctuary for a birdwatching session and taught identification of passerine and non-passerine species of avian fauna. The Camp also include a visit to one of the research facilities of the Indian Council for Agricultural Research where scientists demonstrate modern techniques of grafting, air-layering, irrigation etc. and the pioneering work they have undertaken for strategic and adaptive research for efficient integrated management of natural resources to enhance productivity of agricultural production system through agro forestry and horticultural crops.

2. World Forestry & World Water Day – World Forestry Day and Water Day is celebrated annually on 21st March and 22nd March respectively to spread awareness on the importance of conservation of forests and water. On these days, the Zoo

organizes events, usually in rural areas or within the Zoo where rural women and children are invited keeping in mind the Zoo's ethos of reaching out to the unreachable in order to spread the message of conservation amongst the rural masses. One unique activity was a visit by the Zoo Education Team to a village where the members of a primitive "Sabar" tribe were given a lecture on "Importance of Forests and Water in our Lives" and a "Touch & Learn" programme was conducted for children and adults. The Sabar tribe is a primitive tribe and they are found predominantly in East Singhbhum District of Jharkhand and Midnapore District of West Bengal in India. Primarily forest dwelling, members of the Sabar tribe are reclusive and often cut off from mainstream civilization.

Their numbers are fast depleting and steps are being taken now to provide necessary facilities such as health, education and sanitary facilities so that they are not lost to pressures of the modern world. Ordinarily, members of this tribe would never be able to visit the Tata Steel Zoological Park which is present in an urban conglomeration like Jamshedpur. It is here that the outreach program of the Zoo enabled members of the Sabar tribe to be educated on the need for biodiversity protection and conservation.

3. Vishu Sendra (Annual Ritual Hunt)

The Zoo team, has, over the past couple of years, been organizing awareness campaigns against Vishu Sendra, an annual ritual hunting festival which has been practiced in the Dalma Wildlife Sanctuary over hundreds of years by the indigenous tribes settled in and around the Sanctuary.

The Zoo team supported by the local NGO "SUMANSA" and Forest Department, Government of Jharkhand, had been visiting villages in and around the Dalma Wildlife Sanctuary and meeting the villagers – especially the women and children to explain to them the importance of wildlife in our lives and the disadvantages of hunting wild animals in the Dalma Wildlife Sanctuary at a time when the number of animals and species has depleted in the recent past.

The team, usually spends a week to 10 days visiting villages within and outside the Sanctuary to address them about the impact of biodiversity degradation and the ill effects of Vishu Sendra. Most of the villagers were in agreement with the view that mass hunting is not beneficial as it has adverse effects on the delicate balance in nature in the Dalma Wildlife Sanctuary.

The Zoo team also invited student volunteers from colleges who got first-hand experience of the challenges faced by the tribals and their means of livelihood and they in turn explained to the villagers the importance

of protecting and preserving wildlife in and around their villages so that forest resources are available to their future generations.

“The effects of the awareness campaigns are visible as the number of hunters over the years has reduced and villagers in and around Dalma Wildlife Sanctuary have now started understanding the need to protect flora and fauna around their villages and how protecting wildlife increases the biodiversity of the region and ultimately has positive bearing on their livelihood,” said Dr (Mrs) Seema Rani, Biologist cum Education Officer – Tata Steel Zoological Park.



The awareness campaign against the ritual hunt has been a success and the endeavour should be that such initiatives should run all year round instead of organising them for ad-hoc purpose. More campaigns should be organised for the villages in and around Dalma Wild Life Sanctuary involving education, entertainment, and livelihood subjects after an in-depth study of the relevant needs of the villagers vis-a-vis their ecosystem so that they feel inclusive with the community development efforts of the Forest Department. Without any tangible investments in community development it will be difficult for the villagers to believe our point of view that development efforts in these areas by the Forest Department are inclusive and for their benefit. It will also be extremely beneficial for the villages if certain genuine demands of the villagers are met – such as setting up and refurbishment of schools, opportunities for sustainable livelihood, more involvement of women in village development efforts etc are met.

4. Earth Day

To celebrate Earth Day, the Zoo Education Team organizes workshops for school children where they participate in interactive life skills development programmes which are usually conducted by subject matter experts. The Tata Steel Zoological Park Education team tries to make these programmes fun and at the same time informative. One such programme was where school children participated in a programme on “Compost making at your home”. During this workshop on vermi-composting it was demonstrated in simple terms, the process to be followed at home to prepare vermi-compost. Students were apprised on the fact that conservation is the practice of caring for natural resources in order to live sustainably. This is the only way through which people can reduce waste and manage natural resources wisely. Many other types of, such as plant conservation

and animal conservation, depend on soil conservation. Maintenance of soil fertility and biota are essential to human survival. Without soil, the plants necessary for people and animals to survive could not exist. Fertile soil is exhausted and lost to erosion because of poor farming practices, such as, monoculture, contour strip cropping, clear-cutting etc. It is for the youth of today to be aware and responsible of our environment and biodiversity and it is for them to protect these for our future generations.

5. Best Eco-Club Teacher Award

Every year during Wildlife Week which is organized during the first week of October, Tata Steel Zoological Park, as part of these celebrations, recognizes and honours high school and college teachers for their year-long involvement with their Eco Club activities with the sole intent of generating awareness on wildlife conservation. Entries are invited from Eco Club teachers of various schools and colleges in and around Jamshedpur. Submissions by these teachers should include sustainable environmental activities organized by the Eco Club for their students. Weightage is given to activities which the institution organizes outside the campus and which provides students more exposure to outdoor initiatives and the sustainable impact it will have on flora and fauna in the region. The entries are usually judged by renowned members of academia, wildlife experts, conservationists and experts related to the field. Tata Steel Zoological Park has been organizing the contest for the Best Eco Club Teacher Award for over the past eight years and this has stimulated Eco Club teachers of various educational institutions to develop more innovative and inclusive activities for the eco warriors of tomorrow. Instead of initiating events like symbolic tree plantation, poster and debate competitions etc. the students are now being encouraged to take on more impactful activities via their Eco Clubs to include programmes like rainwater harvesting, participation in compulsory afforestation, energy consumption mapping and reduction and



other such tangible initiatives which will have a direct impact on environmental protection and biodiversity conservation.

6. Reaching out to unreachable: In addition to regular education initiatives taken by Tata Zoo, one of the prime responsibilities is also to reach out to those people in the society who do not have easy access to zoos either due to their social status, remoteness or disability. The Zoo, in association with other likeminded NGOs, organised conducted tour of rural women and children, children from Madarsas, cancer patients, children from schools from areas surrounding Jamshedpur. They were provided a guided tour of the Zoo followed by a touch and learn programme in the Nature Education Centre at Tata Zoo.

Results and Conclusion

Due to these outreach activities undertaken by Tata Steel Zoological Park, the focus of bringing about environmental awareness has expanded exponentially to include marginalized sections of the society including rural women and children, endangered tribes and forest dwellers, amongst others.

By organizing events like the Nature Camp, we have converted an otherwise passive visit to the Zoo into an annual jamboree where girl students (who otherwise would not be allowed to venture out into the forests by themselves) got the opportunity to juxtapose their interests with fun and learning activities over four days.

Ratcheting up awareness activities within the Zoo and layering them with additional outreach beyond the Zoo boundaries has undoubtedly helped the Zoo's cause playing a stellar role in its awareness and education initiatives.

In terms of numbers, these outreach activities by Tata Steel Zoological Park have successfully managed to spread the word about biodiversity protection and ecological awareness amongst more than 30000 people during 2016 – excluding the 470,000 visitors who visit the Zoo annually. Through these activities, the Zoo Education Team has successfully turned zoo education more inclusive, holistic and comprehensive by altering the method of awareness delivery from a monologue to a multilogue.

Acknowledgement: To carry out such type of challenging educational awareness programme would not have been possible without the help of Zoo officials; volunteers; officials of Dalma Wildlife Sanctuary; Local NGOs and Clubs who are all true nature activists, enthusiastically associated with wildlife conservation. Special thanks goes to Mr. Sandeep Raj Singh, Communication Consultant, Jamshedpur; Mr. Sanjay Kumar Mahato, Curator and Mr. Bipul Chakrabarty, Director, Tata Zoo and Central Zoo Authority.

Tata Steel Zoological Park, Jamshedpur

Email cmarani00@rediffmail.com

Central Zoo Authority

Email: brijkishor68@yahoo.com

Latin American Bird Festival, a regional strategy to address Aichi Goal 1

Vieyra-Guzmán Miguel-Angel¹, Maruscak Natalia², Syrowicz Valerie³, Martínez María Eugenia⁴, Rodríguez B. Indra⁵ and Salazar A. Rosmary⁶

1 Former Regional Representative IZE, Mexico. mvieyra.sma@gmail.com

2 Latin America Regional Representative IZE, Argentina. nmaruscak@gmail.com

3 Education Department Manager, Parque Zoológico Nacional La Aurora, Guatemala. vsyrowicz@aurorazoo.org.gt

4 Head of Educational Department, Zoológico Guadalajara, Mexico. mmartinez@zooguadalajara.com.mx

5 Head of the Education and Extension Cultural Division, Parque de las Leyendas, Peru. indy5@gmail.com

6 Tourism Coordinator, Parque de las Leyendas, Peru. rosmarysalazaralza@gmail.com



I. Framework

The Secretariat of the Convention on Biological Diversity (CBD) declared the Decade of the United Nations on Biodiversity 2011-2020 by issuing a Strategic Plan as a framework for action with the aim of halting the loss of biological biodiversity. Its vision is that by 2020, biodiversity will be valued, conserved, restored and used rationally, maintaining ecosystem services, sustaining a healthy planet and ensuring essential benefits for everyone.

According to the World Zoo and Aquarium Conservation Strategy (WAZA, 2015), zoos are in an advantageous position to support the Aichi goals through education, public programs, marketing and public relations. Zoological institutions are able to raise special emotional connections between animals and visitors to provide opportunities for formal and informal learning in conservation education and environmental education and strengthen the mission of zoos and aquariums on promoting conservation action.

With the previous experience of the Latin American Campaign for Education and Conservation on the Jaguar² (2014) which involved a total of 35,249 visitors from 10 zoos and aquariums from 5 different countries, and in which staff training activities were developed, non-education staff was involved, education materials in different formats were shared, diverse activities for a range of audiences were presented and the results of

all institutions were integrated into a joint assessment, Latin American zoos and aquariums are invited to join the 2016 campaign with the title: Latin American Bird Festival (Figure 1). Initially, the World Bird Festival was a proposal from Birdlife International³, one of our current partners.

The reason to choose such a broad topic is to develop a campaign that could be adapted to the possibilities and resources of each institution, always considering the Aichi Goal 1.

II. Objective

Develop a strategy of joint work between zoos and aquariums in Latin America with the theme Latin American Bird Festival, to support the goal 1 of Aichi of promoting the value of local bird diversity and the actions that can be adopted for its conservation and sustainable use.

III. Work plan

A work plan was carried out during 2016 and 2017 between the participating institutions and the regional representative. It is summarized in Table 1:

| | Time | Action | Responsible |
|---|---------------|---|-------------------------|
| Regional representative: Miguel Vieyra | March 2016 | Send an expression of interest in the campaign activities' to the regional representative | Participant institution |
| | April 2016 | Each institution shares at least one education material with other educators | Participant institution |
| | April 2016 | Build up a Dropbox folder to share education materials and activities | Regional Representative |
| | July 2016 | Send the institutional programs of activities to the Regional Representative | Participant institution |
| Regional representative: Natalia Maruscak | January 2017 | Receive reports from each participating institution. | Regional Representative |
| | February 2017 | Send the participant institutions the article's draft, asking for their comments | Regional Representative |
| | March 2017 | Send the article to the IZE's Journal editor for suggestions and publication in the issue 2017. | Regional Representative |

IV. Activities carried out by participating institutions- summary

A. Parque Zoológico Nacional La Aurora (Guatemala)



The institution carried out 2 activities (figure 2):

• Bird Photography Course:

A photography course was taught on grounds (birds found at the zoo and migratory birds passing through the zoo), taught by a professional photographer specialized in birds (Ricardo Ubico). It was given in two parts: theoretical and a practical (2 hours each). The main objective was to generate appreciation and respect for birds and educate the participants about the habits and habitats of various birds in Guatemala.

• Interactive Stations:

This activity was aimed at visiting public taking into account that it would be during a national holiday: Children's day. Ten interactive stations were designed in order to show the diversity of birds, their biology, the dangers that they face and the importance of their roles in the environment in order to emphasize their conservation. Zoo conservation programs were also showcased. The event was held over 4 days in a 3-hour span.

Interactive Stations inside the park:

1. Physiognomy: Size, wings, and feathers (with experiment)
2. Physiognomy: Beaks and feet
3. Reproduction: Nests and eggs
4. Diversity and migration
5. Roles in environment (relatable to 1 and 2)
6. Dangers and conservation projects: Red macaw, local parrots and Humboldt penguin.
7. Humboldt penguin experiment
8. Interactive bird masks
9. Bird yoga and storytelling
10. Bird photography display by the Guatemalan photography club

B. Zoológico Guadalajara (Mexico)

Within the campaign's framework, the institution carried out a scientific activity (Figure 3) with the visiting public and high school students. This activity takes place annually within the science



field and it is less known by the general public: Monitoring Avian Productivity and Survival (MAPS). The Guadalajara Zoo is located on the edge of Barranca de Huentitan and it is ideal for Monitoring of Winter Survival (MOSI in Spanish). The main objective was to involve the local community to know what species of birds are coming to the city and its immigration impact.

It should be noted that despite being a scientific activity, it gave way to open this type of activity at the Zoo with the visiting public; adapting delicate handling techniques for bigger groups.

This activity would not have been possible without the collaboration and organization of the EKOKABAN group, through biologist Said Felix, who carried out the technical procedures as well as the use their monitoring equipment, nets and rings.



C. Parque de Las Leyendas (Peru)

A cycle of activities was carried out (figure 4) aimed at the visiting public with the objective of informing and sensitizing the population about the importance and current conservation situation of Peruvian birds. Two days of activities were dedicated. Among the activities that were developed are: Bird Watching Day, Ecological Video Projection, Educational and Art Workshops, Awareness Talks about the Andean Condor and Humboldt Penguin, among others.

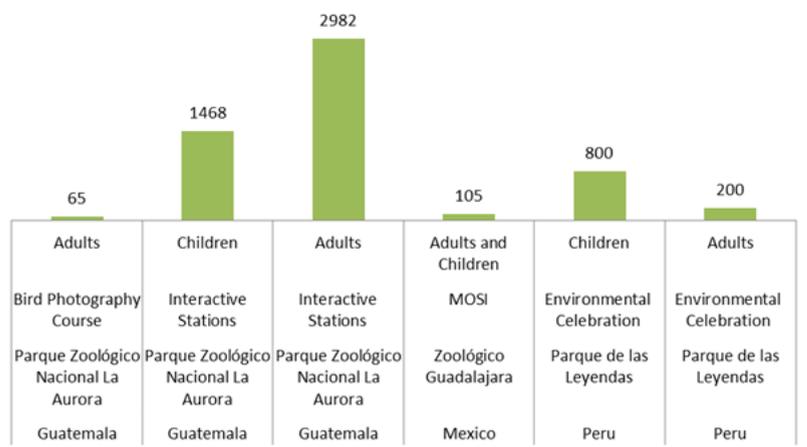
V. Regional results

A. Quantitative results

1.1 Institutions, countries and activities:

A total of 5 zoos from 5 different countries participated in the campaign, developing activities depending on their institutional possibilities.

Number of participant by activities, age range and institution



1.3 Guadalajara Zoo- Monitoring of Winter Survival
The results are summarized in table 2 (number of species and individuals that were caught).

The species that was most captured was *Spizella passerina* with 99 catches, representing 44.39% of all catches. This can be attributed to all the surrounding grassland areas where large flocks feed. Other species of sparrows such as *Melospiza lincolnii* were caught, which represented 10.31%, followed by *Passerina versicolor* with 6.63%.

B. Qualitative results:

- Optimize the conservation education programs and enhance the joint work between Latin American zoos and aquariums.

- Collaborate with the Aichi Goal 1, raising awareness of the value of the local diversity of birds and the actions they can adopt for its conservation and sustainable use.
- Identify the most accurate strategies to be applied in the region.
- Optimized education staff training.
- Increased contact and work with communities.
- Address the campaigns to the right target audience.
- Produce a regional, inter-institutional article for the IZE journal 2017.

VI. Conclusions

The Latin American Birds Festival (FLA) was the second experience of implementing a regional campaign. Although the number of participating institutions was smaller with respect to the previous campaign (Jaguar Education and Conservation Campaign, 10 zoos and aquariums from 5 different countries participated). In general, some of the educational strategies that had been successful in the previous edition were replicated.

The number of people in the visiting public that participated, was much lower than that of the previous campaign (35,249 reported visitors participated). The number of educational activities was also lower. This is related to the smaller number of participating institutions and other variables that have not been measured.

Most educational activities were aimed at raising awareness of the diversity of birds of each country involved, in some cases, projects or conservation programs existing such as the Conservation Humboldt Penguin Program (Parque de las Leyendas). Moreover, the Guadalajara Zoo especially involving the local community in the search process and generation of scientific knowledge on migratory birds.

This type of collaborative work must continue to allow improvement in the educational strategies and practices that each institution plans.

We are aware that much more needs to be done, but this type of regional practice can over time achieve or improve international standards in conservation education.

| # | Species | Number of individual caught | % |
|----|----------------------------------|-----------------------------|-------|
| 1 | <i>Amazilia violiceps</i> | 7 | 3.14 |
| 2 | <i>Amazilia violiceps</i> | 3 | 1.35 |
| 3 | <i>Ammodramus savannarum</i> | 1 | 0.45 |
| 4 | <i>Cardellina pusilla</i> | 2 | 0.90 |
| 5 | <i>Columbina inca</i> | 7 | 3.14 |
| 6 | <i>Cynanthus latirostris</i> | 5 | 2.24 |
| 7 | <i>Empidonax oberholseri</i> | 1 | 0.45 |
| 8 | <i>Melospiza lincolnii</i> | 23 | 10.31 |
| 9 | <i>Melospiza lincolnii</i> | 5 | 2.24 |
| 10 | <i>Mimus polyglottis</i> | 1 | 0.45 |
| 11 | <i>Oreothlypis celata</i> | 1 | 0.45 |
| 12 | <i>Oreothlypis virginiae</i> | 2 | 0.90 |
| 13 | <i>Passerina amoena</i> | 1 | 0.45 |
| 14 | <i>Passerina amoena</i> | 4 | 1.79 |
| 15 | <i>Passerina caerulea</i> | 1 | 0.45 |
| 16 | <i>Passerina versicolor</i> | 15 | 6.73 |
| 17 | <i>Peucaea ruficauda</i> | 8 | 3.59 |
| 18 | <i>Pheucticus ludovicianus</i> | 1 | 0.45 |
| 19 | <i>Pheucticus melanocephalus</i> | 1 | 0.45 |
| 20 | <i>Poliophtila caerulea</i> | 4 | 1.79 |
| 21 | <i>Pyrocephalus rubinus</i> | 1 | 0.45 |
| 22 | <i>Regulus calendula</i> | 1 | 0.45 |
| 23 | <i>Setophaga audubonii</i> | 4 | 1.79 |
| 24 | <i>Setophaga coronata</i> | 1 | 0.45 |
| 25 | <i>Spinus psaltria</i> | 1 | 0.45 |
| 26 | <i>Spizella pallida</i> | 4 | 1.79 |
| 27 | <i>Spizella passerina</i> | 99 | 44.39 |
| 28 | <i>Spizella versicolor</i> | 1 | 0.45 |

1.2 Participants:

A total of 5,620 (reported) visitors participated in the activities of the campaign at different institutions in 2016 (figure 5). Not all the institutions were able to share their results.



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Once in a lifetime memories - Environmental learning associated with marine animal interactions

Judy Mann-Lang and Kim Ngcobo

SAAMBR, uShaka Sea World, P.O. Box 10712, Marine Parade, 4056, Durban, South Africa
jmann@saambr.org.za



Introduction

Physical interactions with animals in zoos and aquariums are often considered to be one of the best ways to reach visitors emotionally and cognitively. The up-close, personal and tactile nature of the interaction and the opportunity to engage personally with a trained staff member together have the potential to enhance the visitor experience and encourage environmental learning. However, the positive impact of such experiences on visitor environmental learning has been questioned, while the potential negative effect of the interaction on the animal has also received attention (Fernandez, Tamborski, Pickens, & Timberlake, 2009). In the context of aquaria, there has been a recent upsurge in interest in aquatic animal encounters, particularly with animals such as sharks and rays (Cater, 2010). However, this aspect of the aquarium visitor experience has seldom been addressed. Research into the role of aquatic animal encounters in visitor learning thus requires further attention.

uShaka Sea World, situated in Durban on the east coast of South Africa, is the only large marine theme park in Africa. The facility consists of a large aquarium, dolphin and seal auditoriums and a penguin rookery. Set amid tropical gardens, the shipwreck theming enhances the immersion experience of visitors. In addition to passive viewing of a wide diversity of fish, sharks and marine invertebrates; daily educational presentations are also available to visitors.

One of the features of the uShaka Sea World visitor experience is the opportunity to truly immerse in the habitat of the animals. The Ocean Walker (Fig. 1) gives visitors a chance to 'walk' on the bottom of a large 2000 m² exhibit, with over 100 species of fish

Figure 1 Visitors enjoy the Ocean Walker animal encounter .

Figure 2 The Shark Dive experience seen from the exhibit window at uShaka Sea World.

Figure 3 The Ray Feed encounter proceeds under the watchful eye of a trained aquarist.



and rays.

The Shark Dive (Fig. 2) immerses visitors in a large shark exhibit where they can view the animals close up from the protection of a cage. During the 'Ray Feed' (Fig.3) visitors are able to feed a variety of stingrays and large fish from a platform in the exhibit, under the guidance of a trained staff member. Visitors book in advance for, and pay for these three animal encounters.

The Turtle Feed (Fig. 4) is an ad hoc experience whereby visitors are invited to join the animal keepers during a routine turtle feed, for free.



Figure 4 Visitors experience a personal encounter with a turtle during a routine husbandry procedure.

Animal welfare is routinely monitored during these encounters. In the case of the Ocean Walker and the Shark Dive, the visitors are in the exhibit for less than three hours per day, while the Ray and the Turtle Feeds are undertaken three or four times a week. In the case of the former, the fish and elasmobranchs are accustomed to divers and exhibit normal swimming and breathing behaviour before, during and after the encounters, while in the case of the latter two encounters, the animals are trained to be fed by aquarists as a part of their husbandry requirements. The visitors take the place of the aquarists on selected days, under the guidance of trained aquarists.

Aim

Although anecdotal evidence suggests that visitors doing all four encounters enjoy their experience and learn more about the animals with which they interact, there was no data to support such claims. It was, therefore, necessary to undertake research to more fully understand the impact of these encounters on visitors' environmental learning.

Methods

Between March and July 2016 a total of 204 adult (>18 years of age) visitors completed a questionnaire after experiencing one of the four encounters. The questionnaire was designed to provide demographic information, basic satisfaction ratings, and included two scales adapted from previous research (Ballantyne, Packer, & Falk, 2011), one was designed to measure environmental interest and one to measure environmental learning. In addition, three qualitative questions were asked. The quantitative data were analysed using SPSS Version 24 and the qualitative data were analysed manually.

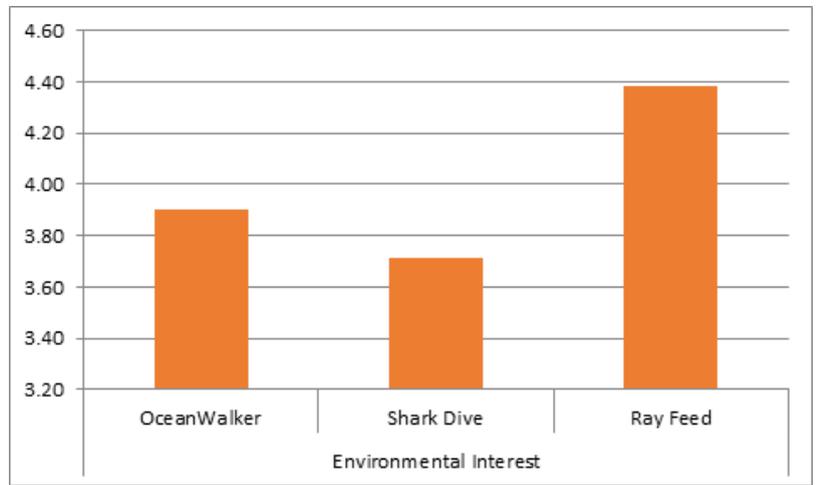


Figure 5. Environmental interest reported by visitors after participation in an animal encounter at uShaka Sea World. (Scale 1 – 5)

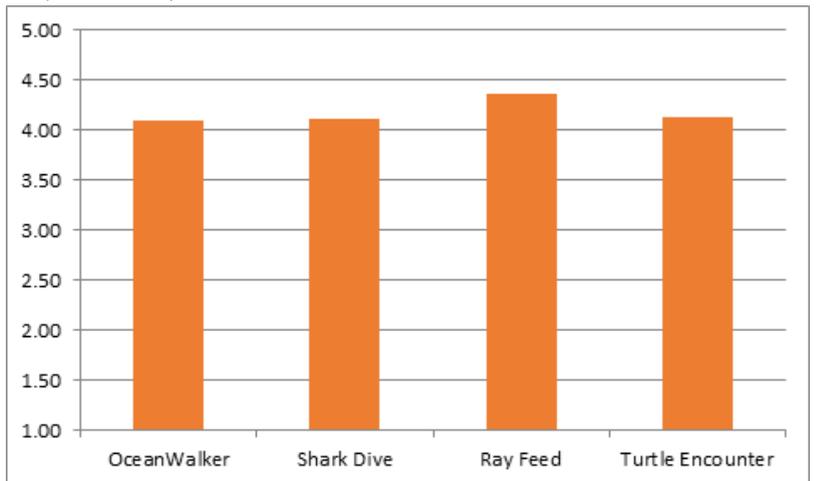


Figure 6. Environmental learning reported by visitors after participation in an animal encounter at uShaka Sea World. (Scale 1 – 5)

Results

Demographic Profile: Overall, more females (60.5%) responded to the questionnaires than males. Most visitors (90.7%) had not previously done an animal encounter. Almost half of those doing the Ocean Walker and the Shark Dive were repeat visitors to uShaka Sea World, while for the Ray and Turtle Feeds this figure rose to over 70%. Almost all respondents (97.1%) noted that they would recommend the experience to other people. Visitors younger than 39 years of age made up the majority of the participants. Chi square analysis revealed a few significant differences between the visitors who selected to do different activities. Overall the Turtle Feed attracted a higher percentage of older visitors, $\chi^2 [6, N=202] = 22.545, p=0.001$, and a higher proportion of repeat visitors, $\chi^2 [3, N=202] = 8.294, p=0.040$. Very few international tourists did the Ray or Turtle Feeds.

Environmental Interest: A one way analysis of variance (ANOVA) revealed that visitors who had undertaken the Ray Feed expressed a significantly higher interest in the environment ($F[2,158]=4.185, p=0.017$) than those

undertaking the Ocean Walker or the Shark Dive (Fig. 5). For logistical reasons the question was not asked of those visitors spontaneously undertaking the Turtle Encounter.

There were no significant differences in environmental learning between the four experiences (Fig. 6).

Motivation

As visitors were invited to participate in the Turtle Encounter, their motivations were not representative of those who selected and paid for one of the other encounters. Amongst visitors undertaking the other three encounters, a specific interest in the animals motivated their participation less than a desire to have fun or by the opportunity to undertake an exciting novel experience e.g. *'To experience what it is like under the ocean and see all the animal life from close up'* (Table 1). For many participants in the Ocean Walker and the Shark Dive encounters, the experience was on their 'things to do list', while the Ocean Walker was seen as a way to celebrate a special occasion (e.g. birthday or honeymoon).

Behavioural Intention

When asked what environmental actions they would like to undertake at home as a result of their encounter, 51% of visitors cited some form of conservation behaviour such as recycling, saving water or electricity, taking better care of nature, etc. as an action. An example of this is *'Make better choices because these animals are at risk of going extinct if we don't make better choices. I will be open to how I can contribute to making sure that these animals are still around for our great grand kids'*. Overall 49% of participants could not articulate something that they would like to change in their environmental behaviour at home. A total of 70% of participants in the Turtle Encounter expressed some

form of conservation action and of these many noted a desire to share their knowledge with others.

Memories

When visitors were asked about what aspect of the experience they would remember, overall 65% noted some aspect of the animals, such as size, the feel of the skin or some other aspect e.g. *'The wonder and excitement of feeding a sea animal'* and *'How soft the rays were'* (Table 2).

For many visitors getting close to the animals in their own environment was especially memorable e.g. *'Being one with nature. Up close experience with a natural predator'*. In particular, the sting rays were noted by visitors as being especially memorable - *'The sting rays were amazing'*, *'The rays are not as bad as we thought'* and *'Feeding them, the way they suck the food and how smooth they feel'*.

Visitors also noted surprise at their positive emotional response to the sharks *'The sharks are amazing'*, *'Their contentedness and calmness around people'*, *'Being one with nature'*, *'Up close experience with a natural predator'*, *'Seeing sharks up close and personal'* and *'Up close encounter with this majestic animal'*.

Discussion

The debate about the merits of animal encounters largely centres on the potential negative impact of the encounter on animal welfare vs the potential positive impact of the encounter on visitor environmental learning.

As has been noted in previous research in Australia (Cater, 2010), overall the animal encounters attracted younger tourists, keen to undertake a new and exciting experience. The visitors attracted to the Ray and Turtle Feeds were slightly older, repeat visitors. The excitement and novelty of the experience itself was the primary motivator to undertake the experience – visitors noted 'to try something different and new', 'for fun adventure and memories' and 'to take risks and experience new things', while the specific animals themselves were less of a motivator.

Table 1. Motivations for Animal Encounters at uShaka Sea World [Open-ended question 'Why did you do this encounter?']. (Valid percent)

| | Ocean Walker | Shark Dive | Ray Feed | Average |
|--|--------------|------------|----------|---------|
| Fun and excitement of a new experience | 40.00 | 50.79 | 52.63 | 47.81 |
| The animals | 4.62 | 17.46 | 15.79 | 12.62 |
| To celebrate a special occasion | 18.46 | 3.17 | 5.26 | 8.97 |
| Bucket list | 15.38 | 11.11 | 5.26 | 10.59 |
| It was recommended / Opportunistic | 21.54 | 17.46 | 21.05 | 20.02 |

| | Ocean Walker | Shark Dive | Ray Feed | Turtle Feed | Average |
|--------------|--------------|------------|----------|-------------|---------|
| The activity | 37.50 | 27.27 | 10.00 | 10.34 | 21.28 |
| The animals | 59.38 | 58.18 | 90.00 | 72.41 | 69.99 |
| Other | 1.56 | 9.09 | 0 | 10.34 | 5.25 |
| Conservation | 1.56 | 5.45 | 0 | 6.90 | 3.48 |

Table 2. Visitors' memories of the Animal Encounter at uShaka Sea World [Open-ended question 'What will you remember from your encounter?']. (Valid percent)

All visitors were interested in the environment, but the higher environmental interest of those participating in the Ray Feed suggested that those visitors were predisposed to learn about the environment during their visit.

As excitement and fun motivated most participants, it was interesting to note that all visitors expressed relatively high levels of environmental learning (>4 on a 5 point scale). In addition, it was encouraging to note about half of the respondents mentioned a future behavioural intention with respect to the environment. Of particular interest was the high percentage of participants who articulated a specific aspect of the animals that they would remember. Many visitors expressed various emotions after their encounters. These emotions ranged from excitement and happiness to wonder and awe. Previous research has shown that heightened emotions can help to facilitate learning, and that the emotional nature of the experience is directly related to what visitors remember and share (Myers, Saunders, & Birjulin, 2004). Sharks and rays are generally viewed negatively by people and are associated with fear (Correia das Neves & Rocha Monteiro, 2014). Visitors in this study selected to do an experience because of its perceived danger or excitement, to have fun or because it was on their 'bucket list'. The animals themselves were viewed as frightening, thereby enhancing the excitement. However, after the encounter visitors appear to be more positive about the animals. The nature of visitors' comments suggests a change in perception towards both the sharks and the rays. The heightened emotions associated with the encounters may have contributed to the high reported levels of learning.

It has been suggested that, by bringing people into the space of the animals in an environment in which the animals are in control of their actions and free to express typical behaviour, such as is found in walk through zoo exhibits, generated an empathy not possible in traditional exhibits (Allen & Veasey, 2015). The results of this study appear to support this proposition. Visitors who had experienced an encounter all expressed high level of learning and a positive emotional response to the animals with which they shared a space.

Although limited by response biases, particularly social desirability responses and the fact that only visitors who were prepared to participate in the survey could be included in the study (Mann, 2016), this research has answered some interesting questions about immersion exhibits in which visitors are truly submerged with the animals, and shows that the excitement and fun associated with such an experience can be harnessed to enhance visitor learning without a negative impact on animal welfare. Future research is needed to compare differences in visitor learning between visitors who do, and those who do not undertake such immersion experiences.

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Stories that go beyond the zoo walls: approaching the community to the wetland ecosystem

Paola Gómez Ovalle, Catalina Rodríguez Álvarez, Daniela Gómez León, Liliana Andrade Lagos

Abstract

Sabana Centro is a region that includes 11 towns located near Bogotá, the Colombian main city, and it has many natural wetlands. However, one of the main threats to this ecosystem is the ignorance of the community about wetlands. Recognizing the impact of working with communities, and in alliance with the restaurant Andrés Carne de Res, we formulate and apply an educative project about Sabana Centro wetlands, coordinated with the purpose of the restaurant social responsibility program “Andrés y Lucía”. The project was carried out with 100 children in 12 sessions after which the children were introduced to the wetland ecosystem, including the biodiversity associated and the threats they face. This project is an important component of our educative program intended to strengthen the knowledge of the communities about biodiversity in order to develop a conscious citizenship.



The Cundiboyacense highland has a great diversity of wetlands in which high Andean, sub-Andean and lowland stands out (CAR, 2011: 42-43). Chía is a municipality belonging to the territory of Sabana Centro with strong influence of the upper basin of the Bogotá river (Universidad de la Sabana, 2015: 52-53); thanks to its geographic conditions, the presence of wetlands was common; however, these ecosystems have now been altered and made invisible due to human intervention and excessive demographic growth, which is also reflected as mentioned by Mejía and Chicué (2014) in the current environmental conditions of the municipality, where the pollution of rivers and problems in the sewage systems are recognised.

Introduction - Wetlands in Context

The wetland is an intermediate ecosystem between the aquatic and terrestrial environments, with moist, semi-humid and dry portions, characterized by the presence of very unique flora and fauna. The Ramsar International Convention, aimed at the conservation and wise use of wetlands, defines these ecosystems:

Places that include a wide variety of habitats such as swamps, peatlands, flood plains, rivers and lakes, and coastal areas such as marshes, mangrove and grassland meadows, but also coral reefs and other marine areas whose depth at low tide does not exceed six meters and artificial wetlands such as ponds treatment of wastewater and reservoirs (Ramsar, 2006).

Taking into account that wetlands are ecosystems that provide multiple environmental services (water flow regulators, biodiversity reservoirs, historical memory, environmental education and ecotourism scenarios, air producers and purifiers, etc.) (CAR, 2011: 11), it is necessary to create strategies of dissemination and rapprochement with the communities that favor their recognition and appropriation by them.

Educational programs around wetlands.

In order to support processes for the recognition and appropriation of these ecosystems by the children of Chia, Jaime Duque Park carries out environmental education processes in alliance with institutions such as the Andres Carne de Res Restaurant (like



an activity book was designed for the participants to replicate and strengthen the different dynamics performed; in addition, a didactic unit was developed for Sabana Centro teachers, in which activities related to those implemented during the sessions are presented, but they allow the teacher to adapt them according to the context in which they are located.

Discussion

The educational actions developed by zoological institutions and alliances established with other entities are necessary and important within the communities surrounding them. This is possible if the ideal of working within the institutions is transcended, and a broader action scenario

the present one) that encourage and support the conservation of both wetlands and species with an important ecological value that inhabit it, as spotted gallinule: *Porphyriops melanops bogotensis* (an endemic subspecies that has a large number of free ranging individuals in the lakes of the Jaime Duque Park).

On the other side, the project “Andrés y Lucía” seeks to contribute to the integral development of children with attention deficit and problems in their behavior through art therapy, boosting creativity and exploring multiple skills. In this way, the methodologies proposed in the different sessions sought to be in line with the objectives sought by the project, establishing a link between artistic, recreational, creative and environmental education methodologies.

Methods

In this experience, we worked with a population of approximately 100 children among 7 and 17 years old, inhabitants of Barrio Santa Lucía in the Municipality of Chia. In particular, they are students with attention deficit and some behavior problems in the classroom. Prior to the sessions development, a diagnosis was made that facilitated the design and focus of the activities that articulated the objectives pursued by “Andrés y Lucía” project. This allowed for a total of 12 themes that addressed the concept of wetland and related aspects (biodiversity, threats, importance, etc.) that were developed over 6 months. Finally,

is established that contemplates the role of communities in understanding the conditions in which their region is located, and the maintenance and care of the local ecosystems, a fundamental aspect in environmental education processes.

In particular, this experience made it possible to highlight the importance of working with children on issues related to the regional context in which they are found, as these are not often addressed in conventional education. In this way, the wetlands, the interactions among its different components and the native biodiversity were the articulating themes that brought the participants closer to their environment. On the other hand, the activities implemented strengthened the capacities in children of creativity and teamwork, and the resolution of problem situations leading to the development of citizen competencies. In turn, this activity helped this population to recognize its territory in different areas and identify the characteristics, importance and threats faced by the wetland’s flora and fauna, both at local and national level.

The activities carried out highlight the exploration that was established with the senses, since the children had to face different situations that were solved only by putting them to the test. At the same time, it was observed that it is not always necessary to have complex material to develop the sessions, but instead simple exercises contribute to generate greater reflections.

Conclusions

It is critical that communities close to the zoological institutions and their context, are what direct the processes of environmental education that are undertaken from these entities.

In this region, addressing the issue of wetland ecosystems represents a tool for the inhabitants to recognize different aspects of the territory in which they live, taking knowledge as a first step to promote care and conservation.

Within the processes of environmental education it is important to make use of flashy tools for children as in this case. Art, play, creativity in the face of problem situations are allied tools in environmental education processes.

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Author email Paola Gomez Ovalle, Environmental Education Coordinator, Bioparque Wakata, pgomez@parquejaimeduque.com.co

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Evaluating the Impacts of Semi-Facilitated Educational Experiences on Visitor Engagement with Zoo Exhibits

Sarah M. Dunifon¹, Brian Johnson, Ph.D.² Jason M. Aloisio, Ph.D.³

¹ Research and Evaluation Associate, Wildlife Conservation Society, USA

² Director of Educational Research and Evaluation, Wildlife Conservation Society, USA

³ Project TRUE Program Coordinator, Wildlife Conservation Society, USA

Abstract

In the current study, researchers implemented a direct observation study at the Bronx Zoo to measure levels of engagement with zoo exhibits between visitors participating in semi-facilitated educational experiences (Quests) and regular visitors. Stay time and engagement behaviors were analyzed for significance. The data suggest a relationship between Quests participants and increased stay time. Levels of engagement behaviors were similar between groups, though some statistically-significant differences were found. The findings suggest a relationship between participating in a semi-facilitated educational experience and visitor engagement with zoo exhibits.



Moss, Jensen, & Gusset, 2014; Wyles et al. 2013). At the four zoos managed by the Wildlife Conservation Society (WCS) in New York City, these connections are forged through educational programs such as Quests, a semi-facilitated on-grounds program that leads visitors through a series of themed stations and activities.

Yearly Quests evaluation occurs in order to measure programmatic outcomes and identify areas for improvement. During 2015, the Quests program evaluation found that the information visitors recalled after participating in Flight! (a Quest at Bronx Zoo) was based around exhibit messaging, suggesting that Flight! may have helped facilitate greater visitor engagement with associated exhibits. In the summer of 2016, program management staff were particularly interested in the potential effects of the Quests program on the visitor experience. Therefore, one part of the 2016 evaluation focused on the following question: To what extent, if at all, do semi-facilitated educational experiences strengthen engagement with permanent zoo exhibits?

To answer this question, the Research and Evaluation unit within WCS's Education Department carried out a direct observation study during the 2016 summer and autumn seasons.

Methods

The direct observation study focused on Flight!, a Quest that took place within the Bronx Zoo's World of Birds exhibit. The study used a timing and tracking model to measure stay time in the exhibit areas and the presence or absence of visitor engagement behaviors. Two populations were compared in the study: Quest (visitors participating in the Quest) and non-Quest (visitors not participating in the Quest).

Engagement in the context of informal science learning institutions such as zoos, aquariums, museums, and science centers can be defined as actively seizing

Introduction

Zoos and aquariums strive to deliver visitor experiences that go beyond exhibiting animals and create meaningful connections with wildlife. These connections are imperative as visits to zoos and aquariums can contribute to biodiversity literacy, science learning, and conservation action (Falk, Storksdieck, & Dierking, 2007; MacDonald, 2015;

| Behaviour | Behaviour Defined |
|--------------------------------------|---|
| Look at animal(s) | Subject views animal(s) for more than 30 seconds |
| Look at signage | Subject views signage for more than 3 seconds |
| Read signage aloud | Subject reads written exhibit details aloud to group. |
| Do Quest activity alone | Subject does not interact with others in group during Quest activity. |
| Do Quest activity with others | Subject works with member(s) of group on Quest activity; may include asking questions, helping to read or write text, and explaining. |
| Comment on Quest activity | Subject verbalizes a thought about the Quest activity. |
| Ask question on Quest activity | Subject verbalizes a question about the Quest activity. |
| Comment on animal(s) or exhibit | Subject verbalizes a thought about the animal(s) or exhibit. |
| Ask question on animal(s) or exhibit | Subject verbalizes a question about the animal(s) or exhibit. |
| Interact with Quest staff | Subject speaks with Quest staff or participates in an activity led by Quest staff. |
| Interact with non-Quest staff | Subject speaks with non-Quest staff. |
| Point at animal(s) or exhibit | Subject points at animal(s) or exhibit feature. |
| Take photo | Subject takes a photo of animal(s), exhibit, or signage. |

Table 1 - Visitor engagement behaviors from timing and tracking instrument

learning opportunities (Schwan, Grajal, & Lewalter, 2014). Similarly, “engage can signify to occupy attention, involve, participate, or establish meaningful contact” (Ashley, 2014). In the context of this study, we defined engagement as a deeper level of interaction with exhibit spaces as evidenced by increased stay time and an increased display of key engagement behaviors. Visitor engagement behaviors were identified and defined by the researchers as behaviors that visitors commonly exhibit while observing animals at zoos. Each of these behaviors was explicitly defined (see Table 1) on the observation instrument, and the definitions of certain behaviors were based on a preliminary round of behavioral observations at the beginning of the study. For example, to define “look at animal(s)” and “look at signage,” data collectors measured the time spent doing each behavior by a sample of visitors. The average time was used as a baseline value in the behavioral definition, where any visitor exhibiting a behavior at or above the listed time was considered to be exhibiting that behavior.

At the entrance to the World of Birds building, Quests interpreters invited visitors to take part in Flight! by obtaining a pamphlet that explained several exhibit-focused activities. While Quests interpreters were stationed in the exhibit areas to provide assistance, the activities were designed to be conducted with or without staff intervention. Researchers chose two locations in World of Birds in which to observe visitor behavior: the white-throated bee-eater (*Merops albicollis*) exhibit and the free-flight, mixed-species exhibit on the second floor of the building (herein referred as the “second floor exhibit space”). The Flight! pamphlet featured activities specific to each

of these two areas. For example, in the second floor exhibit space, participants were asked to observe a bird in the exhibit and sketch that bird’s flight pattern. Trained data collectors used a continuous sampling method to identify eligible visitors for observation. As visitor groups entered either exhibit space, the first eligible visitor to enter was observed. Once an observation was complete, the next eligible visitor to enter was observed. Eligible visitors were those estimated by the data collector to be age eight or older. An eligible visitor was assigned to the Quest group if they or one of the members of their visitor group were carrying a Quests pamphlet. Eligible visitors were assigned to the non-Quest group if no one in their visitor group was carrying a Quests pamphlet. Non-Quest observations were carried out during times when Quests were running as well as during times when they were not. Visitors were not informed of the study to control for that knowledge impacting visitor behavior. No identifying information was collected about the individuals. In the case that an eligible visitor inquired about the data collector’s activities, that observation was voided. Research assistants observed an eligible visitor, recorded stay time, and tracked behavioral data using a standardized instrument, until said visitor exited the exhibit area.

Over the course of seven weeks, data collectors observed 208 visitors, with 101 of these visitors assigned to the Quest group and 107 assigned to the non-Quest group. All statistics were completed in the R environment (ver. 3.3.2, R Development Core Team) in RStudio ver. 1.0.137 (RStudio, Boston, MA), and α was set at 0.05 for all tests. The `prop.test` function was used to compare behaviors of the groups between treatments. A Kruskal-Wallis test was used to compare the duration of time between treatments.

| Location | Quest Group Mean (SD) | non-Quest Group Mean (SD) |
|------------------------|-----------------------|---------------------------|
| | Stay Time (seconds) | Stay Time (seconds) |
| All Locations Combined | 148 (95) | 69 (66) |
| Bee-Eater Exhibit | 150 (95) | 52 (46) |
| Second Floor Exhibit | 145 (97) | 89 (80) |

Table 2 Stay time by location and group type

Results

Observation Subjects

Of the 101 observations collected in the Quest group, 29.7% had an adult female subject, 16.8% had an adult male subject, 29.7% had a youth female subject, and 23.8% had a youth male subject. Of the 107 observations collected in the non-Quest group, 44.9% had an adult female subject, 31.8% had an adult male subject, 14.0% had a youth female subject, and 9.3% had a youth male subject.

Stay Time

Visitors participating in the Quests activity spent roughly twice as long (mean (SD); 148 (95)) in the exhibit areas than non-Quest visitors (69 (66); $X^2=48.5$, $df=1$, $p<0.001$). In the bee-eaters exhibit area, average stay time for the Quest group was 150 seconds versus 52 seconds for the non-Quest group ($p<0.001$). In the second-floor exhibit area, average stay time for the Quest group was 145 seconds versus 89 seconds for the non-Quest group ($p=0.002$; Table 2).

Engagement Behaviors

A higher proportion of the Quest group (26%) exhibited the behavior “ask question on animals or exhibit” compared with the non-Quest group (10%; $X^2= 7.5$, $df=1$, $p=0.006$). The behavior “point at animal(s) or exhibit” was exhibited by a greater proportion of the non-Quest group (49%) versus the Quest group (29%; $X^2= 7.8$, $df=1$, $p=0.005$). A greater proportion of the non-Quest group (14%) exhibited the behavior “take photo” compared with the Quest group (2%; $X^2= 8.5$, $df=1$, $p=0.004$; Table 3). No significant differences were found between the Quest and non-Quest groups in relation to the other engagement behaviors.

Discussion

Stay time was significantly greater in the Quest group overall, as well as within each exhibit area. The largest difference in average stay time between Quest and non-Quest groups occurred in the bee-eaters exhibit area. These findings suggest that semi-facilitated educational experiences such as Quests may contribute to visitors spending more time in exhibit spaces. However, it may also be that the visitors most likely to spend more time in exhibit areas are also those who are more likely to choose to participate in semi-facilitated educational experiences.

Proportions tests on the prevalence of engagement behaviors by group type suggest a few differences in levels of engagement behaviors between the Quest and non-Quest groups. Subjects belonging to the Quest group were more likely to “ask a question on animal(s) or exhibit,” while subjects belonging to the non-Quest group were more likely to “point at animal(s) or exhibit” and “take photo.” These findings, however, may be explained by the fact that Quest visitors were typically holding and completing the activity pamphlet, leaving them less capacity to take photos of animals or point at them.

Conclusion

The results of this study suggest that Quests may be influencing the Bronx Zoo visitors’ engagement with zoo exhibits. Most notably, longer visitor stay times in the exhibit areas correlated with Quest participants. This may indicate that Quests are influencing visitor behavior, or it may explained by the fact that visitors likely to take part in Quests may also be more likely to spend longer in exhibit spaces.

The current study suggests that there may be some relationship between participating in a semi-facilitated educational experience and visitor engagement with zoo exhibits. Future studies are needed to further explore this relationship.

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Corresponding Author:

Sarah Dunifon, Research and Evaluation Associate,
Wildlife Conservation Society
sdunifon@wcs.org

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Table 3 Engagement behaviors by group type

| Behaviour | #present in Quest group | % present in Quest group | #present in non-Quest group | %present in non-Quest group | χ^2 | p-value |
|--------------------------------------|-------------------------|--------------------------|-----------------------------|-----------------------------|----------|---------|
| Look at animals | 71 | 70.30% | 67 | 62.60% | 1 | 0.306 |
| Comment on animal(s) or exhibit | 51 | 50.50% | 62 | 57.90% | 0.9 | 0.348 |
| Look at signage | 46 | 45.50% | 48 | 44.90% | 6.72E-31 | 1 |
| Point at animal(s) or exhibit | 29 | 28.70% | 52 | 48.60% | 7.8 | 0.005 |
| Ask question on animal(s) or exhibit | 26 | 25.70% | 11 | 10.30% | 7.5 | 0.006 |
| Read signage aloud | 6 | 5.90% | 14 | 13.10% | 2.3 | 0.131 |
| Interact with non-Quest staff | 4 | 4.00% | 8 | 7.50% | 0.62 | 0.43 |
| Take photo | 2 | 2.00% | 15 | 14.00% | 8.5 | 0.004 |

Taking a Bite Out of Arachnophobia

Erin Boyle, Aquarist, John G. Shedd Aquarium, USA

Introduction

Saturdays at Shedd Aquarium are always busy as tourists and native Chicagoans fill the historic lake front attraction. My coworker and I were set to do an animal encounter featuring a live tarantula in the Amazon Rising exhibit. As the first exhibit through the door, Amazon Rising was cramped with people. As my coworker gave her presentation, I sat patiently with a beautiful Chilean rose tarantula (*Grammostola rosea*) gracefully walking through my hands. After that encounter, my fondest memory of tarantula encounters occurred. A father thanked me for my ability to hold a large spider so effortlessly and calmly. He said he hoped that his daughters would learn from my example, and not scream every time they saw a spider in their home. I wish that all people could appreciate the tarantula encounters and spiders in general like that man.

Unfortunately, many humans have an issue with a spider's very presence. My problem is with the many people that hate spiders and senselessly kill them! This issue started in 2003 when I achieved my dream hired as a nature interpreter at Shedd Aquarium in Chicago. One of my job responsibilities was working

with the animals used in animal encounters for guests. The collection included different kinds of reptiles, birds of prey and invertebrates. Ignorant of people's deep-seated fear, disgust and hatred of spiders and their relatives, anytime we brought a tarantula out for a public program, we were bombarded with negative feelings and reactions. While I understood that tarantulas/spiders are not among people's favorites, a relaxed, friendly Shedd staff member stood before guests with a tarantula in hand, and some people would not get within 10 feet of the spider. What was going on here? Why did people get so upset? Why does just about everyone think tarantulas are terrifying or disgusting? It was completely frustrating.

Determined to fulfill Shedd's mission of connecting people to animals, I pushed forward. Over the years, I honed my interpretation techniques and my tarantula encounter presentation. I became an aquarist, concentrating my efforts on caring for the program animals and delivering animal encounters. After countless observations at the animal encounters, I decided that it did not matter if people liked spiders, but it did matter they understood that spiders make human lives better. After framing my presentations around this concept, some people

were more receptive, but many die hard spider haters remained, including some of my coworkers. Instead of honoring spiders and their important role in ecosystems and biodiversity, people often react extremely negatively when seeing a spider or even when hearing about spiders. This evasion of spiders creates challenges for anyone who wants to teach people about spiders and lead them to an appreciation of spiders. Making connections to spiders and their habitats can lead to recognition and value of all creatures and their habitats.

Origins of Fear

In 2014, I started graduate school and decided the main goal of my graduate work would be to inspire people to appreciate the importance and beauty of spiders and their habitats through public engagement and professional development. I needed to know the origin of these negative feelings. While we live in a modern society with advanced technology and knowledge, many humans still possess phobias of animals. Among the animals that frighten people, spiders are ranked in the top five (Gerdes, Uhl, & Alpers, 2009). The sources of this fear are both learned as well as ancestral. Evolution could be to blame for human's rooted arachnophobia. The *Latrodectus* genus, also known as widow spiders, has venom that is especially effective on vertebrates and could have caused our ancestors a great deal of pain and discomfort if bitten (New & German, 2015). Symptoms of a widow spider bite are cramps, severe nausea, muscle pain, other issues and infrequently death; symptoms can last for many days or weeks making a widow spider bite one of the most medically significant (Graudins et al., 2012; Yaman, Mete, Ozer, Yaman, & Beton, 2015). Phobia of spiders grew from potential interactions with threatening widow spiders and consequently caused the sensation of fear to have increased selection in people (Rakinson, 2009). As fearfulness elevated the chances of survival, it is likely that natural selection increased arachnophobia's prevalence, and correlated to all spiders, regardless of their toxicity (Gerdes et al., 2009). This is especially true among women - avoidance and fear of spiders increased survival for them as well as their children, whose survival would have greatly decreased without a mother to care for them (Buss, 2015).

Disgust also pushes people away from spiders. Humans often steer clear of possibly toxic and unsafe animals (Wagler & Wagler, 2014). As stated in Gerdes et al. (2009), contamination and illness has been attributed to the presence of spiders. The human response is to physically move further from these animals. Disgust is transmitted culturally and since medieval times, spiders have been tied to transmitting disease and bringing about infection

(Gerdes et al. 2009; Van Strien, Franken, & Huijding, 2014).

Teachers and parents can be instrumental in shaping children's feelings about spiders. According to Dubi, Rapee, Emerton, and Schniering (2008), children showed increased fear and avoidance when their mother had a negative reaction to a toy spider. Dubi et al. (2008) also stated after seeing a parent or other influential person acting anxious or fearful that children exhibited the same feelings and behaviors. A child's mindset towards animals can be profoundly affected by education and lessons in school. Instead of invertebrates, mammals are often the focus of classes (Wagler & Wagler, 2014). This can be determined by the teacher's attitudes towards animals, but also by state learning standards, attention to passing standardized testing and other lesson priorities.

The Benefits of Spiders

While there is a lack of knowledge of spiders and people display adverse reactions, these animals provide many benefits for humans and the environment. Particularly important is that spiders prey on many animals that are regarded as pests, providing protection for food consumed by people. Naturally found throughout the world, spiders control the populations of insects and small animals. With spiders, there is less need to use cancerous pesticides ("Less pesticides mean," 2003). Spiders also provide contributions to biodiversity and play an important role in food webs. Mammals and birds, animals that many people enjoy, prey on spiders (Wagler & Wagler, 2014). Worldwide, tarantulas are consumed by humans in many cultures, providing protein in the diet. Many human diseases and conditions can be treated using spider venom. Some tarantula venoms have proteins that help treat muscular dystrophy and chronic pain (University of Buffalo, 2012).

The Role of Zoos and Aquariums

Humans need to understand, respect and protect the role of spiders in the environment. School, television and the Internet can teach people about spiders, but seeing a live spider in person is probably one of the best ways to learn. Zoos and aquariums can provide a safe learning environment and a chance to receive accurate information about all types of animals and the importance of biodiversity. Many conservation efforts use flagship species, typically visually appealing and often larger animals, to rally support for animals and their habitats. In spite of the appeal of flagship species, Skibins (2014) reported that many zoo visitors are interested in more species than polar bears, great apes and elephants. Aquariums and zoos can use careful exhibit design and thoughtful interpretation to broaden the types of animals considered to be flagship species (Skibins, 2014). Emphasis on various species over the traditional flagship species may help to increase the variety of visitors to zoos and aquariums and in turn conservation messages will be heard and shared by more people. Species biodiversity is

defined as the inclusion of all found species worldwide and one mission of conservation biology is to classify species (Primack, 2010). People need to understand that species are dependent on each other, and that the presence of an organism has an acute effect on the survival of other organisms and the overall health of their ecosystem. Reaching more than 700 million visitors worldwide, aquariums and zoos are poised to increase knowledge on biodiversity and actions to keep species and their habitats safe (Moss, Jensen, & Gusset, 2014). Zoo and aquarium programs featuring a live animal are especially effective at changing attitudes and preconceived ideas about animals that are generally feared or not appreciated. Stanford (2014) found that feelings of disgust in children significantly decrease after meeting and touching animals like rats and snakes. Through my research, I found that carefully worded messaging about tarantulas and spiders at the tarantula encounters was extremely effective. When asked to rate tarantulas and spiders in terms of importance to the balance of the ecosystem, the average guest response was extremely high importance. When asked why they gave that rating, guests commented that spiders eat pests, control insect populations, or protect the food supply.

Conclusion

Although I have encountered much negativity over the years at tarantula encounters, there are many positive moments that shine through. While one may not make a difference with all people, some people simply need a little insight and guidance. My research has taught me that some people cannot help their feelings towards spiders. However, it has also inspired me to continue to share my passion for tarantulas with others and encourage those who work in my field to do the same. While contemplating animals to include in a program collection, consider a tarantula. When sharing information, carefully choose your messaging and start off by accepting people's feelings. I often start my encounters with a joke to make people a little more comfortable. It is always helpful to remind people ways that different species help to improve human life. Try to be sensitive to the origins of people's feelings towards certain animals. Keep in mind that it may not be their fault they fear certain animals and lack knowledge about certain species. With the help of other zoos and aquariums, maybe one day my problem with spiders will disappear as people make connections to and share a message of appreciation for these animals.

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Contact: eboyle@sheddaquarium.org

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The Amazing Giant Tree Spiders of India and Sri Lanka! A Community-Based Arachnid Education and Environmental Education Project

Ron Wagler

Associate Professor of Science Education
Director of the Living Arthropod and Environmental Education Laboratory
The University of Texas at El Paso

Abstract

This article describes an education project called “The Amazing Giant Tree Spiders of India and Sri Lanka!” This collaborative community-based education project involved the captive-bred Endangered (EN) and Critically Endangered (CR) living *Poecilotheria* tree (i.e., arboreal) spiders from a university laboratory, the local zoo, zoo volunteers, elementary school children and the university preservice (i.e., future) elementary teachers. All of these participants were essential to the success of the project. With guidance the university preservice elementary teachers developed living *Poecilotheria* tree spider activities that they taught to the children at the zoo. All of the activities had a component that addressed human activities that are driving species closer to extinction or have driven species to extinction. After the children participated in the activities they had much lower levels of fear and disgust towards the spiders, had very positive environmental beliefs toward the spiders and now had a very strong desire to save the tree spiders from going extinct. With a tendency to focus educational outreach on charismatic megafauna, this project shows the positive benefits that can occur when education projects are focused on arthropods and bring together multiple groups of people from the community.



Introduction

India and Sri Lanka are home to some of the largest tree (i.e., arboreal) spiders in the world. These beautiful spiders reside in the *Poecilotheria* genus (See Figure 1) and can reach lengths of up to 28 centimeters in diameter. Sadly, most of these amazing spiders are on the edge of extinction because of habitat loss and other environmentally destructive human activities (Author, 2011, 2017). This article describes an education project called “The Amazing Giant Tree Spiders of India and Sri Lanka!” This collaborative community-based education project involved captive-bred Endangered (EN) and Critically Endangered (CR) living *Poecilotheria* tree spiders from my university laboratory, the local zoo, zoo volunteers, elementary school children and university preservice (i.e., future) elementary teachers.

Figure 1 Poecilotheria ornata: One of Sri Lanka’s Endangered (EN) Arboreal Spiders

Methods

Under guidance the university preservice elementary teachers developed living *Poecilotheria* tree spider activities that they taught to the children at the zoo. Students were also assisted by zoo volunteers. All of the activities had a component that addressed human activities that are driving species closer to extinction or have driven species to extinction. The preservice elementary teachers also utilized hands-on scientific inquiry teaching techniques appropriate for elementary children (National Research Council, 1996, 2009, 2011).



Figure 2 Children Participating in the Spider Activities. Note: The spider enclosures are on the tables where the children are working. The spiders were never touched by anyone involved in the project.

Figure 2 shows some of the children participating in the spider activities. Figure 3 shows some of the children performing an observation activity on one of the *Poecilotheria* spiders used in the project. Figure 4 presents examples of some of the products the children made during the spider activities. And lastly Figure 5 provides an example of one of the websites the children used during the spider activities. This website provides information on the conservation status of species. This specific webpage provides information on the Critically Endangered (CR) *Poecilotheria metallica* from India. Please note that because of space limitations the author is not able to place the spider activities in this article. To receive the free spider activities used in this project and other free living arthropod education activities that integrate ecological concepts and environmental awareness, please contact the author.



*Figure 3 - Children during a *Poecilotheria* Spiders Observation Activity*

Before the children participated in the spider activities they were asked to rate their level of fear (F) and disgust (D) toward the spiders and answer environmental belief (EB) questions about the human activities that are driving species closer to extinction or

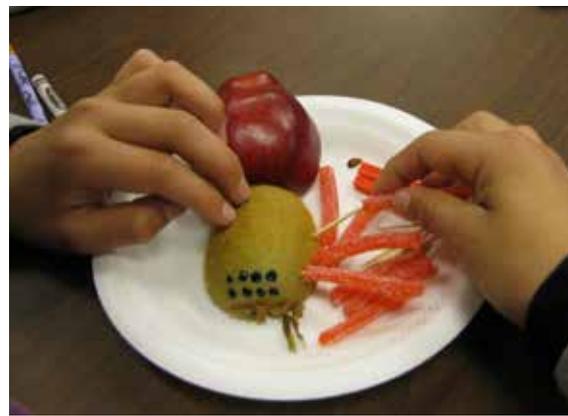


Figure 4 Spiders the Children Made out of Food and Art Materials



have driven species to extinction (i.e., EB 1-5). These human activities are the spread of invasive species and genes; overexploitation of species; habitat modification, fragmentation and destruction; pollution and climate change (Author, 2011, 2017). They were also asked if they believed humans should let the spiders go extinct (i.e., EB-6). These environmental belief questions were:

- EB-1. I believe humans should not modify, fragment or destroy the natural habitat this animal lives in.
- EB-2. I believe humans should not pollute the natural habitat this animal lives in.
- EB-3. I believe humans should not change the climate of the natural habitat this animal lives in.
- EB-4. I believe humans should not take too many of this animal from the natural habitat they live in.
- EB-5. I believe humans should not let invasive species into the natural habitat this animal lives in.
- EB-6. I believe humans should not let this animal go extinct in the natural habitat this animal lives in.

After the children participated in the activities they were again asked these same questions. These children were in the treatment group (i.e., the group that participated in the spider activities). There was also a control group of children that participated in the project. These children did not participate in the spider activities but took the pre-test and post-test.

Results

Table 1 presents the means and standard deviations for the pre-test and post-test for both the treatment and control group. The scores presented are the children's Likert Scale ratings from 1-5. When the children rated their level of fear (F) and disgust (D) toward

| Group | Time | EB-1 | EB-2 | EB-3 | EB-4 | EB-5 | EB-6 | F | D |
|-----------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Control | Pre | 2.15 | 2.22 | 2.26 | 2.25 | 2.23 | 2.31 | 4.38 | 4.12 |
| | | -0.82 | -0.69 | -0.68 | -0.88 | -0.88 | -0.88 | -0.9 | -0.91 |
| Control | Post | 2.18 | 2.22 | 2.22 | 2.24 | 2.27 | 2.32 | 4.31 | 4.1 |
| | | -0.84 | -0.68 | -0.72 | -0.88 | -0.82 | -0.82 | -0.97 | -0.96 |
| Treatment | Pre | 2.21 | 2.24 | 2.32 | 2.29 | 2.3 | 2.31 | 4.46 | 4.15 |
| | | -0.81 | -0.75 | -0.69 | -1.04 | -0.97 | -0.97 | -0.87 | -0.99 |
| Treatment | Post | 4.17 | 4.14 | 4.14 | 4.2 | 4.2 | 4.17 | 2.34 | 2.08 |
| | | -0.81 | -0.86 | -1.05 | -0.85 | -0.92 | -0.92 | -0.78 | -0.67 |

Note: EB=Environmental Belief Questions, F=Fear Question and D=Disgust Question

Table 1- Means and (Standard Deviations) for the Children's Spider Ratings

the spiders they used a scale that ranged from "Not at All" [1] to "Extremely" [5]. When the children answered the environmental belief (EB) questions they used a scale that ranged from "Strongly Disagree" [1] to "Strongly Agree" [5].

The data (see Table 1) shows that before the spider activities began both groups (i.e., treatment and control) had very high levels of fear (F) and disgust (D) toward the spiders, had very negative environmental beliefs toward the spiders (i.e., EB 1-5) and had a very minimal desire to save the spiders from going extinct (i.e., EB-6). The control group, which did not participate in the activities, continued to have very high levels of fear (F) and disgust (D) toward the spiders, had very negative environmental beliefs toward the spiders (i.e., EB 1-5) and had a very minimal desire to save the spiders from going extinct (i.e., EB-6). After university students taught their activities to the children in the treatment group, the children had much lower levels of fear (F) and disgust (D) towards the spiders, had very positive environmental beliefs toward the spiders (i.e., EB 1-5) and now possessed a very strong desire to save the spiders from going extinct (i.e., EB-6).

Discussion

This project utilized an unlikely group of animals to change children's emotions about spiders from negative to positive and, in doing so, changed their environmental beliefs about saving an amazing and rare group of giant tree spiders. This is the type of initial positive change that is needed in the next generation of children so that we can begin to take the steps needed to save species that are on the edge of extinction. There is often a tendency to focus animal education on the animals that people already like. We are all too familiar with the examples of "charismatic megafauna" and the strong positive emotions these vertebrates evoke in many people. This project shows that similar results can be achieved when

children learn about and interact with invertebrates in a positive educational setting that involves members of the community. In this case, these positive results were achieved even with animals the children initially feared and found disgusting.

Arthropods are truly amazing animals. They make up more than 75% of the animal species on our planet (Lewis et al. 2002) and their sheer numbers are incomprehensible. Estimates place the number of living insects on Earth at any one time at one quintillion (i.e., 1,000,000,000,000,000,000) and insects are just one group of many groups of arthropods on our planet. Arthropods can be found on all continents and in almost every body of water on Earth but sadly, as this project points out, some have been pushed to the edge of extinction by human activity. Considering these factors, it is becoming increasingly important that we, as educators, more fully integrate arthropods into our educational outreach efforts.

If you have tended to focus on the more traditional pollinators such as butterflies and bees (that are loved by so many and are also very important to ecological systems) consider branching out and providing more activities focused on detritivores such as roaches and terrestrial isopods. By integrating these living captive-bred arthropods into your curriculum you can teach children how these animals participate in the decomposition of dead organisms and in nutrient cycles that lead to soil fertility. These arthropods also break up soils by burrowing to facilitate plant root growth and serve as food for many other animals in complex food webs. In doing this you very well might also convince children that roaches are not the disgusting animals that society portrayed them as. Also consider integrating more captive-bred arachnids (e.g., amblypygids, scorpions and spiders) into your curriculum with a focus on how these animals maintain an ecological balance by keeping other animal population densities at ecologically healthy levels. Arachnids also benefit people by reducing the number of insects on Earth. Many of these insects can be vectors for human disease (Strickman, Sithiprasasna & Southard, 1997) and can reduce yields

in agricultural plant crops that we eat (Marc, Canard, Ysnel, 2009; Pfannenstiel, 2008). Lastly, pursue opportunities to integrate examples of captive-bred living arthropods that are threatened with extinction. Ultimately these are the very aspects of arthropod education that are often overlooked but when children learn about these arthropods and the essential ecological services they provide they begin to have a broader understanding of how ecosystems work and how these animals provide the very conditions that make life on our planet possible for all.

Corresponding Author email: rrwagler2@utep.edu

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The IUCN Red List of Threatened Species™ 2016-3

Home » [Poecilotheria metallica](#) (Gooty Tarantula, Metallic Tarantula, Peacock Parachute Spider, Peacock Tarantula, Salepurgu)

Poecilotheria metallica

Scope: Global
Language: English
[Download assessment](#)

Enter Red List search term(s) [Discover more](#)

Summary | Classification Schemes | Images & External Links | Bibliography | Full Account

| NOT EVALUATED | DATA DEFICIENT | LEAST CONCERN | NEAR THREATENED | VULNERABLE | ENDANGERED | CRITICALLY ENDANGERED | EXTINCT IN THE WILD | EXTINCT |
|---------------|----------------|---------------|-----------------|------------|------------|-----------------------|---------------------|---------|
| NE | DD | LC | NT | VU | EN | CR | EW | EX |

Kingdom: Animalia | Phylum: Arthropoda | Class: Arachnida | Order: Araneae | Family: Theraphosidae

[Taxonomy](#) | [Assessment Information](#) | [Geographic Range](#) | [Population](#) | [Habitat and Ecology](#) | [Threats](#) | [Conservation Actions](#)

Figure 5: The IUCN Red List of Threatened Species Webpage for *Poecilotheria metallica*

Website: <http://www.iucnredlist.org/>

Snake Awareness Programmes for Government Schools of Ahmedabad, Gujarat, India

S. Sivakumar¹, Jignasa Patel² and Meena Nareshwar³

1, 2 Sundarvan, S. M. Road, Jodhpur Tekra, Ahmedabad-380015.

3 Centre for Environment Education, Thaltej Tekra, Ahmedabad – 380054.

1 s.sivakumar@ceeindia.org, 2 jignasa.patel@ceeindia.org, 3 meena.nareshwar@ceeindia.org



Introduction

Sundarvan is an activity of Centre for Environment Education, Gujarat, India and it is recognised as a Mini Zoo by the Central Zoo Authority of India (CZA). Sundarvan conducts various activities round the year to sensitize people about wildlife appreciation.

Sundarvan is popularly known for its service of snake rescue and snake awareness in Ahmedabad. Snakes are one of the most misunderstood animals and generally killed when encountered in and around human habitations. As a result of our regular snake awareness programmes conducted over three decades, people call us to rescue snakes when encountered instead of killing them. Apart from rescue, awareness gives long-term impact to avoid snake-human conflict. Through our regular snake awareness programmes at Sundarvan, we reach around 20,000 people annually.

Sundarvan tries to reach as many people as possible by offering a range of programmes and activities to visitors, for bringing behavioural change. Due to different constraints, government schools almost never visit Sundarvan.



To cover a number of Government schools and to create a cadre of teachers to bring long-term impact, a proposal was submitted to The Rufford Foundation and through this funding considerable number of government schools (c.15%) in Ahmedabad were reached in 2015-16.

The Rufford Foundation is a UK registered charity which funds nature conservation projects across the developing world. Till now, the Foundation has awarded grants to over 3000 projects in 155 countries.

Methodology

Government schools from the outskirts of Ahmedabad, where children have a higher chance of seeing snakes, were selected and approached to conduct a snake awareness programme. A team of at least two people visited such schools to carryout programmes. An interactive, pictorial presentation on snakes, covering topics such as characteristic features of snakes, distribution, diversity, venomous, non-venomous, precautions to avoid snakebite, first aid in case of bite, snakebite and treatment, conservation issues and myths and facts were shown to them. Artefacts such as slough was carried to the school to use as touch table material to enhance the experience of the participants. A questionnaire survey with following questions was made to the students before (n=768 students) and after (n=765 students) the programme to evaluate the effectiveness:

1. Which of the following snakes are venomous?
2. Do snakes drink milk?
3. Do snakes have bones?
4. What should be done in case of snake bite?
5. Do we need snakes?



A booklet on snakes was developed as resource material and was distributed to all the participants. A set of two posters developed by Sundarvan on venomous and non-venomous snakes was also distributed to the schools for display at prominent places.

Some of the schools visited Sundarvan for the programme. The entry fee and snake awareness programme charges were waived for the schools, as the Grant covered those expenses. The students and teachers were taken around the zoo and a snake awareness programme was conducted. The resource materials were given to them. Apart from these, they had an opportunity to view our reptile exhibits.

Two one-day Teacher orientation workshops, accommodating 30 teachers each were conducted. An activity manual on snakes with basic information on snakes and simple activities to carryout in schools to experience effective and joyful learning was also developed as resource material and distributed to all the participants.

Results and Discussion

A total of 82 different schools were covered through this project both by Sundarvan visiting the schools and schools visiting Sundarvan. We reached 9043 students and 321 teachers. The result of the questionnaire survey made before and after shows the effectiveness of the programme (Fig. 1 to 4). Only one student gave the right answer for all the five questions before the programme and 100 out 765 gave all right answers after the programme.

Overall, the programme was well received. The participants including students and teachers asked various questions to clarify their doubts on snakes. Teachers from many schools informed us that this programme was very useful and very informative, as most of the information delivered was new to them. A questionnaire with feedback option was circulated amongst the teachers. Most of them answered that the programme was useful to the students and it covered some of their curriculum. Most of them suggested that the pictorial presentation was interesting and informative. At the same time, few suggested to include some videos.

Two teachers' orientation programmes were carried out on 19 and 20 August 2015. Sessions to introduce reptiles and guided tours in the reptile section were conducted. The participants were divided into three groups and asked to perform activities provided in the manual that was given as resource material to all of them.

India is the second most populous country in the world and has got around 300 species of snakes. Despite the fact that there are more than 60 species of

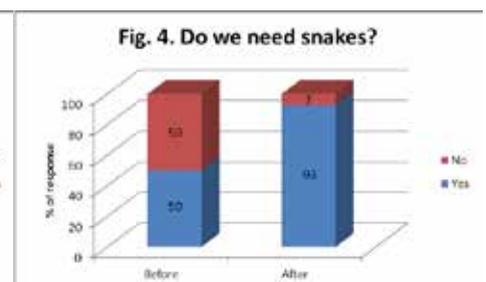
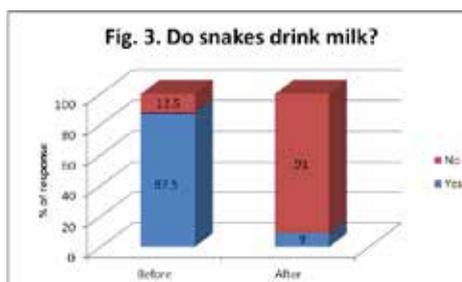
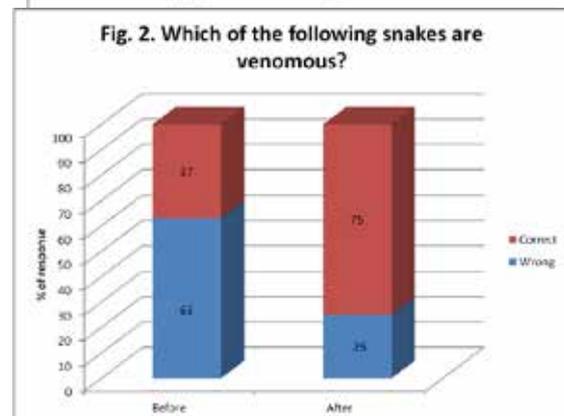
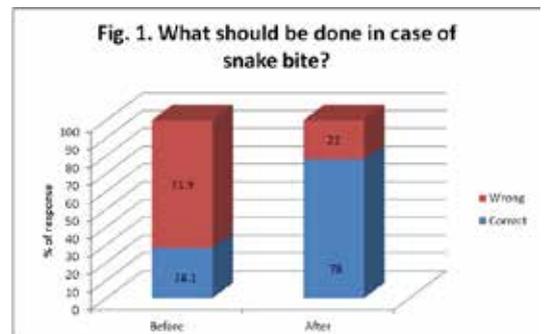
venomous snakes in India, only four species that are widely distributed, cause most of the snakebite mortalities. A large proportion of global totals of snakebites arise from India. In order to reduce death due to snakebite in India, along with antivenom provision, effective interventions using education and awareness is a must (Mohapatra et al. 2011).

Acknowledgement

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Shoulder to Shoulder

Nardi Simpson

Aboriginal Special Projects, Taronga Zoo, Australia



For nine years Taronga Zoo has delivered the Burbangana Zoo Awareness Program, a joint initiative between Taronga and the New South Wales Department of Family and Community Services (FACS). The program is targeted at Indigenous young people in state care who are deemed to have high and complex needs. They attend the zoo for a period of twelve weeks and take part in activities centred around Taronga's Education Centre. The young people take part in activities that include animal handling, husbandry, food preparation, as well as assisting lessons and presentations. This is supplemented with a strong cultural learning element, exploring Indigenous connection to animals, country, environment, material culture, stories and identity. The program proved so successful that in 2011 it expanded to include a sister program at Taronga Western Plains Zoo Dubbo, again for Indigenous young people, this time in foster care. Burbangana and Walanmarra have to date supported over 90 Indigenous young people in the care of FACS through the program. The children have blossomed in many ways in their time at the zoo and in turn, they have given both zoos an incredible gift: the realisation of an ability to heal people, as well as the capacity to advocate for animals and the environment.

2016 marked the 100 year anniversary of Taronga Zoo and the organisation was planning a list of events to help celebrate its wonderful achievement. Indigenous staff at Taronga also worked hard to think of ways to mark the milestone in a culturally significant way, a way that reflected the view and values of its Indigenous staff and young people who had found a place within the organisation. Shoulder to Shoulder was that event.

For thousands of years Aboriginal people have walked country, using movement through place as a way of deep learning and listening, as a way of understanding the connectedness of all living things, and to learn and imbed your responsibility within that connection. Walking country was also a major part of attending ceremony and special events. Taronga was now in the position of having two programs, running at sites in Sydney and Dubbo, for Indigenous young people, engaging in culture, and a big birthday to celebrate. The natural thing was to combine all these elements and walk that story into the earth. Shoulder to Shoulder consisted of a journey from Western Plains, Dubbo, to Taronga, Sydney, with our young people, moving through country, listening and learning, about country, ourselves and each other, arriving for the Zoo's big birthday celebration in October.

21 young people rotated through the 490 km walk. They were accompanied by Taronga staff from Dubbo and Sydney as well as staff from FACS. The walk was conducted over 15 days and travelled through six Indigenous nations, staying at local primary schools, community halls and campgrounds along the way. It visited important cultural sites including Talbragar Mission Reserve, Castle Rock, Biamie's Cave, Mt Yengo National Park and cultural sites in Sydney Harbour. Walkers met and learnt from many community members and elders, who shared their knowledge of country and gave strength and support for the long roads that lay ahead. There were blisters, sore muscles, warm fires and nights filled with thousands of stars. Roads were paved in rain and in glorious sunshine, and feet danced in time to a song or moved in silent contemplation. The country shifted through echidna covered bush and green paddocks holding cattle. The paths lead past sheep birthing their lambs, eagles soaring overhead and whales sending in misty spray into the salty air. On the 7th October 2016, 21 amazing young people, who have suffered and struggled through many hardships in their short lives, walked the final 800 metres from Taronga Wharf to the Zoo's top entrance. Halfway up, a line formed, made of zoo staff, locals, families and friends. They all cheered as they lined the street, clapping the walkers on as they took their final steps to the top of the hill. Those of us that were lucky enough to be part of this amazing project were part of something incredibly special. Words at times, fail to do actions such as these justice. They came to us as young ones who needed something positive in their life. Over their time in the program and those 15 days on the road, we came to realise they had given us so much more. Encased by culture, their gifts of resilience, of determination, and of bravery made us realise in fact that they had been carrying us on their own shoulders the whole way.

The Burbangana and Walanmarra Programs continue to go from strength to strength with phase 2 now being delivered, extending the participants time with the zoo for an added 12 weeks. The Shoulder to Shoulder journey was filmed and the documentary has been accepted into the World Indigenous Peoples Conference in Education in Toronto in July 2017.



Investigating the Long-term Effects of Informal Science Learning at Zoos and Aquariums

Dr. Brian Johnson¹, Sarah Thomas², Dr. Nicole Ardoin³, Professor Murray Saunders⁴

1. Director of Educational Research and Evaluation, Wildlife Conservation Society (USA)

2Head of Discovery and Learning, Zoological Society of London (UK)

3Assistant Professor, Stanford University (USA)

4Lancaster University (UK)

Abstract

“Investigating the Long-term Effects of Informal Science Learning at Zoos and Aquariums” was a one-year project funded by Science Learning+, an international partnership between the National Science Foundation (US), the Wellcome Trust (UK), and the UK-based Economic and Social Research Council, and in collaboration with the Gordon and Betty Moore Foundation, the MacArthur Foundation, and the Noyce Foundation. The project aimed to identify the opportunities for and barriers to researching the long-term effects of informal science learning experiences at zoos and aquariums.

Introduction

Zoos and aquariums are some of the most popular sites for informal science learning. In the United States, more than 180 million people visit an accredited zoo or aquarium each year, and in the United Kingdom, 25 million people visit accredited zoos and aquariums annually. These impressively high visitation numbers make zoos and aquariums an important focus for informal science learning research. Despite important advances in the zoo and aquarium field in recent decades, there is still no clear understanding of the ways in which zoo and aquarium visitors apply science and conservation learning beyond the walls of the zoo or aquarium—especially in the long term. Khalil and Ardoin (2011) note, for example, that most evaluation of learning at zoos and aquariums has focused on the “immediate effect on knowledge, attitude and behavioral outcomes rather than considering longer-term effects” (p. 174). Our project was guided by one central question: How might we identify and measure the long-term effects of informal science learning experiences at zoos and aquariums?

Methods

We conducted a participatory process that engaged zoo and aquarium education researchers, practitioners, and executives to identify (1) existing efforts to measure the effects (especially long-term) of informal science learning experiences at zoos and aquariums; (2) opportunities for and barriers to measuring long-term effects; and (3) considerations for future long-term effects research. We collected data through three efforts:

- **Literature Review:** The purpose of the literature review was to document previous research into long-term effects of informal science learning at zoos and aquariums. We searched four databases (Academic Search Complete; ERIC; Wiley Online Library; and Taylor and Francis/Routledge Online) using combinations of 12 search terms, for a total of 50 searches in each of the four databases (200 searches total). After applying several exclusion criteria (e.g. publication date, topical focus), 100 articles were subject to a full review.
- **Consultative Workshops:** We conducted three consultative workshops to ensure that our work would be as relevant as possible to the wider informal science learning community. The workshops (which varied in length from three to six hours as appropriate for the workshop objectives, audience, and conference venue) used participatory activities and discussion to gather ideas and input from practitioners, researchers, and other stakeholders in zoo and aquarium education. Workshops were held during 2015 at the European Association of Zoos and Aquaria (EAZA) Zoo Educators Conference in Lisbon, Portugal; the Association of Zoos and Aquariums (AZA) Midyear Meeting in Columbia, South Carolina; and the British and Irish Association of Zoos and Aquariums (BIAZA) Educators Meeting in London, UK. In total, 62 representatives from 49 institutions in 13 countries took part in the workshops.
- **Leadership Survey:** In June 2015, we surveyed leadership-level employees at zoos and aquariums in the U.S. and Europe. Requests to complete the survey were sent out via AZA, EAZA, and BIAZA listservs. We received a total of 117 responses (70 from the US, 21 from the UK, and 26 from the rest of Europe). The survey consisted of four questions focusing on intended outcomes and effects of education programs and existing efforts to measure those effects.

Results

Recent zoo and aquarium education research has focused on short-term outcome measurement.

Of the 100 articles we reviewed for our literature review, just five studies looked at periods of more than six months. While there may be studies that did not match our search terms and therefore were not reviewed, the literature review suggests a need for longitudinal studies (especially multiyear) focused on informal science learning at zoos and aquariums.

Existing evaluation efforts at zoos and aquariums are most frequently focused on participant satisfaction and immediate/short-term outcomes.

Our survey of zoo and aquarium leaders found that nearly one-fifth (n=22) of respondents said there were no evaluation efforts—whether short- or long-term—at their institution. Half (n=58) of the respondents said that their organization's evaluation-related efforts consisted of satisfaction surveys, while roughly a quarter (n=28) of respondents said that they focused their evaluation activities on immediate/short-term outcomes such as message or knowledge retention. This is similar to Khalil and Ardoin's (2011) finding that most zoo and aquarium-focused evaluation has focused on immediate effects. A somewhat surprising finding was that 7% (n=8) of respondents described efforts to measure long-term effects. One respondent, for example, noted a project to track teen participants as they entered university, while another respondent highlighted a three-year project focusing on early childhood education program impacts. However, the remaining respondents who said that they were conducting long-term evaluation projects did not provide any further details.

Evidence for long-term effects of informal science learning at zoos and aquariums tends to be anecdotal in nature.

Participants in the consultative workshops discussed informal science education programs that ran over weeks, months, and even years. They also shared information about shorter annual programs in which audiences participate recurrently. However, evidence for long-term effects of these programs was typically anecdotal. For example, one zoo representative said, "We have had many reports of what an impact we have had on people over the years, including influencing career choices and life-long passions." In a few cases, zoos and aquariums reported collecting data on a regular basis for years, but these organizations were unsure of what to do with the data, i.e. how to analyze the data for evidence of program effects.

Zoo and aquarium professionals recognize the need for and value in identifying and measuring long-term effects.

Data from the consultative workshops and the online survey both suggested strong interest in and support for long-term effects research. Respondents noted that research of this type had the potential to improve programs by (1) identifying effective interventions; (2) providing sound justification for the mission of zoos and aquariums; (3) supporting appeals for funding; (4) guiding strategic and long-term planning; and (5) demonstrating the collective impact of zoos and aquariums on learning.

Most zoos and aquariums lack the capacity and expertise to conduct long-term evaluation and research projects.

Both the consultative workshops and online survey suggested that, in the zoo and aquarium field, there is perceived a lack of knowledge, skills, and confidence to conduct long-term effects research. Further, respondents noted that many institutions are simply not ready to investigate long-term effects, in particular, of informal science learning at their sites. One respondent noted, "We decided that we needed to start with the basics by understanding more about visitor expectations and motivation, and evaluate efficacy of learning styles and methods. Our more immediate questions are around measuring learning outputs and outcomes against specific objectives." Participants at the consultative workshops suggested that future long-term research efforts should include a capacity building element to improve the zoo and aquarium community's ability to engage in this more complex research practice.

Discussion

When we began this project, we envisioned using our findings to help us design a study to measure long-term effects of zoo and aquarium learning experiences. However, our findings and subsequent discussions suggest that evidencing the long-term effect of a single visit to a zoo or aquarium may be impossible. As one of our survey respondents noted, "We need to realize that our impacts come most typically from multiple visits and not a single time." Additionally, it is methodologically challenging to pinpoint the effects of science learning at zoos and aquariums amongst the other sources of science learning in a person's life. Zoo and aquarium learning experiences are in fact just one part of an individual's lifelong science learning journey. We also know that most science learning takes place in informal environments, rather than in schools (Bell et al., 2009). By some estimates, 95% of a person's life is spent outside of school (Falk & Dierking, 2010). Accordingly, research agendas have called for understanding how these experiences interact with the myriad other learning experiences—both formal and informal—in one's lifetime (Fraser et al., 2010; Rennie, Feher, Dierking, & Falk, 2003). Falk and Dierking (2012)

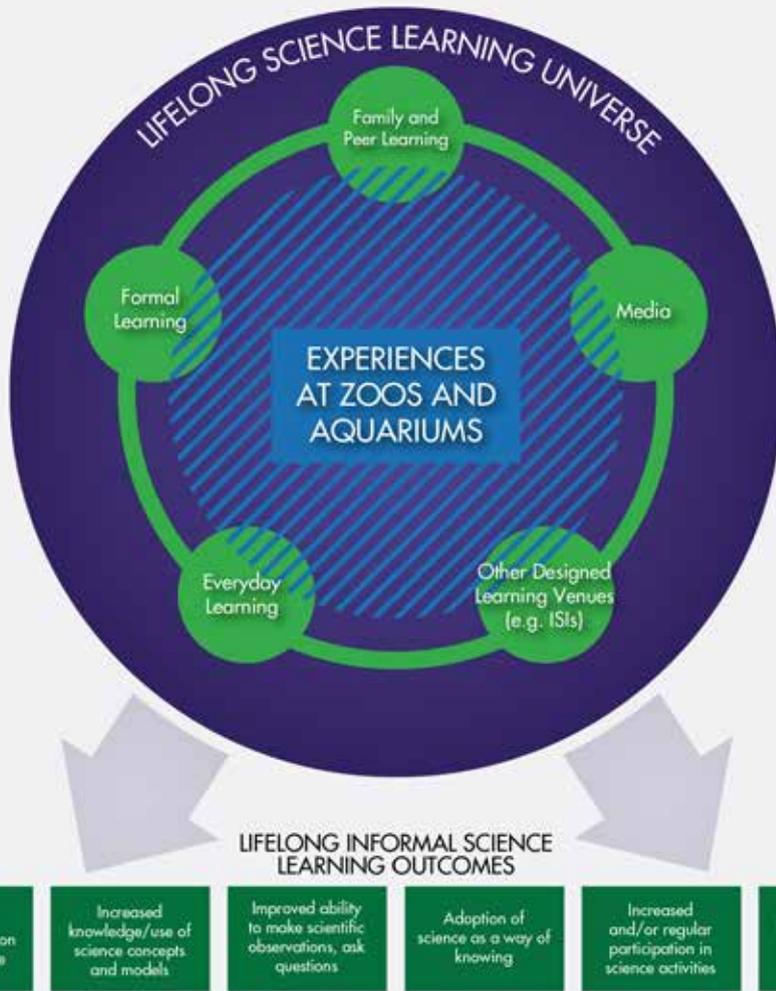


Figure 2: Informal Science Learning at Zoos and Aquariums Theory of Change

have called this “an ecology of learning for life” (p. 1074), bringing the notion of interconnectedness that is central to ecology into the learning disciplines.

Therefore, our project findings have shifted our focus away from a likely futile attempt to isolate the long-term impacts or effects of zoo and aquarium learning only, and toward a research agenda focused on how zoo and aquarium learning experiences interact with, influence, and are influenced by a range of other science learning experiences that may take place in one’s life.

This relationship is represented by the theory of change in Figure 1 (above). At the center of the circle on the left are the types of learning experiences that typically take place at zoos and aquariums (based on data from the consultative workshops). These experiences then interact with other forms of science learning (e.g. formal learning, family learning, media). Together, these experiences can lead to a variety of learning outcomes, here represented by the National Research Council’s informal science learning strands.

Given this shift in focus toward lifelong learning and away from long-term effects, we recommend

that future research consider the contribution of zoo and aquariums to an individual’s lifelong science learning journey, rather than attempt to establish attributional links between interventions and long-term effects. Versions of this inductive approach include contribution analysis (Mayne, 2001), in which possible explanations are tested for their contribution to a present “condition” in circumstances in which experimental methods are inappropriate. This approach would not preclude making comparisons between different dimensions of a zoo or aquarium visit, but keeps open the attributional relationship.

Finally, we recommend that informal science learning researchers use the more open, methodologically neutral and exploratory term effect rather than the more convergent, objective-oriented term impact to denote the longer-term learning outcomes associated with a zoo or aquarium experience.

Our decision is based on a kind of methodological pragmatism, particularly in complex environments such as zoos and aquariums. The notion of impact within the research and evaluation community has been conventionally associated with attempting to identify clear, causal links between controlled or planned treatments or interventions and specified (in advance) objectives or outcomes. In essence, it is as near to an experimental paradigm as is possible. However, this does not characterize the research environment of zoos and aquariums. In these environments, the focus is typically on:

- existing practices undertaken and experienced by visitors rather than planned “treatments”;
- oftentimes unstructured, rather than controlled, experiences;
- unknown outcomes rather than specified objectives.

Therefore, the notion of effect in this context refers to the contribution made by the experience of visiting a zoo

or aquarium to changes in science practices, attitudes or understanding. There are daunting methodological problems in identifying robust causal links between an intervention, a program or an experience of any kind, and the resultant learning. Attribution (i.e. identifying the extent to which a particular experience has created a specific outcome) is particularly problematic in informal learning environments such as zoos and aquariums. Using effect rather than impact does not resolve the problem of attribution, but it does guard against the chimera of certainty and acknowledges the difficulty of establishing unequivocal lines of determination.

Conclusion

At the beginning of this project, we set out to better understand the need for longitudinal studies focusing on informal science learning at zoos and aquariums, and possible approaches for this line of research. Through a literature review, consultative workshops, and a survey, we found that 1) few previous efforts have attempted to measure long-term effects of science learning at zoos and aquariums; 2) zoo and aquarium professionals identify a need for research of this kind; and 3) an approach that considers informal science learning within an individual's lifelong science learning landscape may yield the most relevant and useful research findings. We believe that there is a strong need within our field to examine the contribution of zoo and aquarium experiences to lifelong science learning. This research will fill an important gap in our understanding of zoo and aquarium learning, and the wider informal science learning field.

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Corresponding author contact information

Dr. Brian Johnson bjohnson@wcs.org

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Incorporating Art into Informal Zoo Education Programs to Assist with Topic Retention

Jennifer Hunt

Lead Zoo Teacher, Central Florida Zoo & Botanical Gardens, USA



Introduction

Interest in science is in decline and the lack of interest to work in a scientific field is at an all time low (Osborne, et al. 2013; Elias, 2009; Potvin & Hasni, 2014; Talib, Norishah & Zulkafly, 2014). Research shows attitudes toward science begins to shift negatively at around age nine and continue to decline more quickly after the age of fourteen (Osborne, et al. 2013).

The use of informal education in a zoo or aquarium setting opens possibilities to engage students in science topics reigniting interest and enthusiasm (Lawson, Costenson & Cisneros, 1986; Metz, 2006; Ramey-Gassert, 1997). Although most zoos and aquariums offer education programs, many facilities are missing the mark when it comes to their education departments and using antiquated teaching methods. Modern education practices incorporate art and music into science related activities, yet, this is not occurring in many of the education programs put forth by zoos and aquariums (Turkowski, 1972; Packer & Ballantyne, 2010). Education departments in these facilities have the opportunity to make a difference in the lives of students with the programs offered. It is important to connect with each student in ways that will help

them to learn and grow in the sciences. Incorporating art in the programs is one way for students to connect with a given topic and express their knowledge in a new way. Can using art as part of an informal education program make a difference in the retention of information presented?

According to Michelkevičius, (2012) and Rios & Yankelevich (2013), art, as part of informal science curriculum, can help with the retention and interpretation of the information presented. Wild Artist Camp at the Central Florida Zoo & Botanical Gardens (CFZBG) utilized art and art projects to engage campers in the topics of habitats, adaptations and conservation.

Methods

Study Group and Topics

This study included two, one week half day camps of Wild Artist Camp at the Central Florida Zoo & Botanical Gardens (CFZBG). The camp included 26 campers ages 9 to 12 years old.

Wild Artist Camp introduced three environmental topics including habitats, adaptations and conservation using photography, sculpture, mixed media, painting and drawing to reinforce the ideas presented. Campers' art projects, discussions and surveys, were used to assess their understanding of the concepts presented. Campers led discussions about what they learned through the art projects they were asked to create. Discussion rules and expectations were laid out prior to the first discussion to help campers be comfortable with the process (Hollander, 2002).

Wildlife Habitats

Photography was used to discuss wildlife habitats and the five needs animals must have to survive. These needs include water, food, shelter, space and oxygen. Photographs were incorporated into camper discussions focusing on these needs. While looking at the photos, campers were to point out the needs they felt were important. Following the presentation and discussion; campers ventured into the zoo where they planned and photographed self-portraits at different habitats. The campers were to incorporate as many needs of the chosen animal habitat as possible.

During habitat/photography day campers were asked to create a labeled drawing representing their understanding of the/a habitat, at the end of the day campers created a second labeled drawing using what they learned from their photography project. Drawings were compared to assess pre and post conceptual understanding of needs of animals previously introduced to the campers.

Animal Adaptations

Three art techniques were used when discussing animal adaptations; timed drawings, painting, and sculpture.

Timed drawings were completed at different animal habitats with drawing times of 30 seconds to 5 minutes. The purpose of the timed drawings was to help campers learn to focus on individual adaptations that could be drawn in the allotted time. The shortest time was a wake-up call for campers showing them that they must scale down their ideas. As the drawing time lengthens most campers were able to better focus their ideas.

During the painting activity campers could choose any part of our live model, Ara the Green-winged macaw, to include in their project. Sometimes this included the entire bird, others chose to only paint a foot, eye or beak.

For the campers' sculpture project, campers were asked to create their own animal. Before sculpting, campers were asked to consider the habitat in which their animal lived, the food it ate, etc. When sculpting, campers were to include adaptations the animal would need to have in order to survive in its' environment.

Conservation

Discussions of conservation efforts using art were the main focus of this topic. During a presentation of recycled art, students discussed their thoughts on the topic and how they could encourage others to participate in conservation efforts such as recycling and beach clean-ups. As a group, campers created mixed media art projects using recycled materials. These projects were presented in final camp galleries and students used it to discuss conservation ideas with their guest.

Evaluations

With IRB approval, this study included pre camp and post camp surveys to measure the camper's understanding of concepts presented in the Wild Artists Camp at the CFZBG. Parents and/or guardians were asked to sign a consent form for their camper and had access to the surveys if requested in advance to assist with their comfort level (Anseel et al., 2010). Campers were also asked to sign a consent form before participating in the survey. Both consent forms were emailed to participating families in advance of the camp so that parents could read and ask questions before the first day of camp. The surveys were anonymous and students had the option to opt out of any questions they wished. Each survey took no longer than 10 minutes to complete. No respondent's names were associated with the surveys and no identifying criteria were used. Camper evaluations also included personal observations of the student's comfort level speaking about concepts presented during camp.

Results

Wildlife Habitat

As part of the pre camp survey, campers were asked to describe the word habitat. For evaluation purposes, campers that used terminology such as "has what an animal needs" or "has water, food, and a place to live" were considered good understanding. Descriptions that had no specifics but made statements such as "where an animal lives" were labeled basic understanding. Only 11.5% of campers were considered to have a good understanding of what is needed in a habitat, 34.6% had basic understanding; 53.9% did not answer.

For additional evaluation, campers completed labeled drawings demonstrating their understanding of what creates a habitat. One drawing was completed before our discussion and activity, a second at the end of the day for comparison. The inclusion of the five animal needs including, food, water, space, shelter and oxygen were looked for in these drawings. Post discussion and activity labeled drawings included more needs in comparison to the pre activity drawings. Of the pre activity drawings, 38.4% of campers represented 3 or more needs, compared to 84.6% in the post-activity drawings.

Animal Adaptations

Few of the campers had a good understanding of the term adaptation, with only 50% of the campers having heard the term before. In the survey 7.7% campers demonstrated a good understanding, 19.2% a basic understanding, 42.3% showing no understanding; 30.8% did not answer.

Following adaptation discussions and projects, campers showed a greater understanding of what was meant by the term. In the post camp survey 69.2% of campers were able to list a physical adaptation that was included in one of their art projects, 84.6% were able to verbally describe what an adaptation was using their art projects.

Conservation

In both the pre and post camp surveys, campers were asked about their comfort level speaking to others regarding conservation, in both surveys a great number of the campers had a positive response. In the pre camp survey 42.4% of campers responded with yes, 53.8% maybe, 3.8% did not answer. Following the group discussions and project the numbers increased to 73% yes, 11.6% maybe; 15.4% did not answer.

Discussion

This study took a look at how art could be used in an informal education setting during summer camp at a zoo. It was believed that the use of art could assist with retention of information presented. Pre and post camp surveys, art projects and discussions during the camp showed the use of art did assist with retention and understanding in most cases.

Habitats

The use of photography to examine habitats had mixed results. Campers completed pre and post discussion drawings, which showed an increase of 46.2% in the number of campers with at least 3 animal's needs listed in their drawings, yet in the post camp survey 69.2% of campers did not feel that the photograph project assisted in their understanding. It is possible that the additional understanding was from the group discussions and not attributed to the photography project.

Animal Adaptations

Adaptations were covered with multiple projects including drawing, sculpture and painting. Based on discussions and post camp surveys, campers showed a greater understanding of animal adaptations in the projects that were completed. The use of multiple art forms and projects may have been the reason for the campers' comfort level with the topic. During the closing art gallery where campers showed their completed projects, many discussions took place with guests about adaptation found within the art created.

Conservation

The first camp chose the endangered Red panda as the subject for their multi-media conservation project focusing on creating a 3D art piece for display. Working together as a group has its challenges including differences of ideas and styles but all in all was a good experience for both the campers and camp teachers.

Because of the recent killing of Cecil the lion in Africa, conservation was a topic of passionate discussion during week two of the camp. It was difficult to focus on the positive work being done with such a dramatic story. Campers had laser vision on Cecil's story creating a piece named "Celebrating Cecil." The goal was to create a positive piece for people to enjoy instead of a memorial tribute. That being said, there were several individuals brought to tears looking at the campers' creation; this is the power of art!

Conclusion

We as zoo educators should use every possible method to ignite the fire of conservation and environmental education in the students we teach. Art can be used in many unique ways giving campers the opportunity to express themselves and show concepts that they have learned and share the important message of conservation. The idea of using art can be translated to many other settings including environmental centers and school programs. It should not be limited to only the young, art can be used with any age group with great success. Art, in combination with other teaching methods, can truly enhance the learning experience and help to accomplish the goals we have set of educating our students about the natural world.

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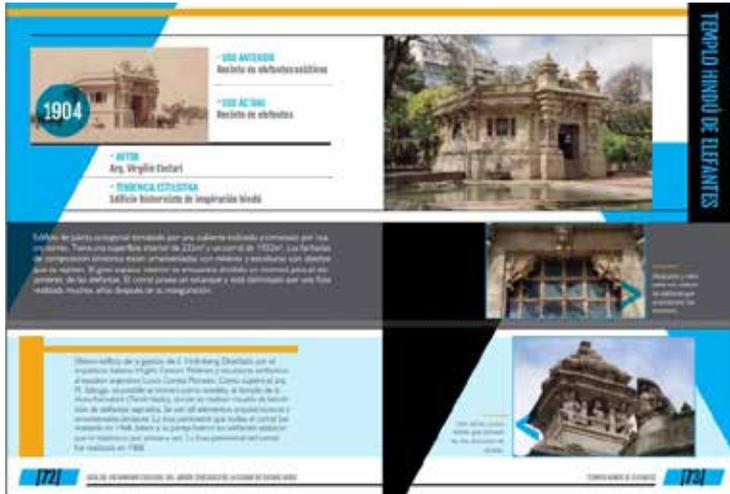


Knowing about cultural heritage through a zoo

Marcela Liliana Díaz¹, María Cristina Fernández²

1 Specialist in Cultural Management; 2 Architect.
EcoparK - Buenos Aires - Argentina

The Guía del Patrimonio Cultural del Jardín Zoológico de la Ciudad de Buenos Aires (Guide to Cultural Heritage of the Zoological Garden of Buenos Aires), the only one published since the opening of the zoo, allows for the first time to frame a proposal made in a zoo within the cultural initiatives of the city.



Introduction

According to UNESCO (2014) education and sustainability are dynamic concepts. There are not universal schemes. Each country defines its methodology and priorities. Education for sustainable development is a long-term process of change based on the balance between society, environment and economy interconnected through culture. Educational and cultural aspects recognize the respect for the values that shape cultural identity, ways of being, feeling, relating, behaving, believing and acting according to context, history and tradition.

Environmental education is one of the main objectives of modern zoos. With Conservation and Research, the three disciplines configure the base of zoo work and assume the commitment to sensitize the community towards the care of their environment.

Zoos are visited by an audience interested in animal species, in some cases, also in botanical ones. Through those species, visitors have access to their problems and possible actions for their care. Historical zoos have in addition: buildings, art and landscape that are part of the local identity and give them characteristics impossible to transfer.

Visiting an historic zoo offers a unique opportunity to approach its integrated natural and cultural resources.

Content

Immersed in the urban landscape, the Zoo of Buenos Aires was established as a typical visit for generations of porteños (born in Buenos Aires City) absolutely delighted with the strategic combination of landscape, architecture, history and nature. However, their community knows very little about Zoo BA history, buildings, most of them are animal's houses, or their design and their makers. The Guide of Cultural Heritage Garden Buenos Aires Zoo is the first published almost 130 years after its official opening on 30 October 1888. The book is divided into two parts: the first one presents the theoretical framework, the second one, records of cultural goods.

The introduction, written by the designer of Dutch zoos, Erik van Vliet, describes the development of zoos in Europe since its origins as sort of cultural centers to the animal world and until today when European historical zoos were reconverted again as places of cultural interest.

The preface emphasizes the interrelationship between museums and zoos, particularly in the case of Buenos Aires Zoo and its unique added value that allows it to contribute to the care of culture from a privileged place.

The following chapter covers aspects about the origin of zoos and their role in preserving the environment, from the oldest menagerie in Egypt until today worldwide and their conservation roles. Like museums, zoos

had an individual origin and became public places for the community, bringing it closer to nature and its conservation.

At this point an approach to culture as a factor of social development is essential. It focuses on the emergence and evolution of the concept of cultural heritage related to individual and private wealth, collecting in the Renaissance, scientific travel to the elitist cultural institution of the time: the museum and its subsequent link with botanical gardens and zoos

In this part, we insert the historical review of the BA Zoo that allows us to understand its link with Buenos Aires City, local and national history and as patrimonial site. BA Zoo was a pioneer in exhibiting wild animals and in research and education, became an expert in wild animal management in controlled environments. Its route merges nature and art, animals and plants, landscape and history, a cultural capital that turned it into a National Historical Monument.

The second part presents the records of the main cultural goods. Those records are the result of years of research and interdisciplinary work. They include: data of emplacement, previous and current use of buildings, author and management, stylistic trend, description and historical review, accompanied by old and current general photos and artistic and architectural details.

Finally, doors open to debate and the inclusion of zoos in culture, like museums protect those things that can hardly be preserved in other spaces. They are exploited to develop conservation strategies with other institutions generating a block towards the care of natural and cultural goods. They preserve evidence of biological and cultural diversity and work for the care of species, ecosystems, environmental goods and documents, aesthetic or historical value.

The initiative was supported by the Mecenazgo Program of the City of Buenos Aires. Through this Regime the City Government receives from citizens cultural projects for evaluation. If those projects get the experts approval and are declared of cultural interest for the city, they will be financed by ceding contributions from the taxpayers who wish to join. The Guide was evaluated by the commission in charge of publications and it was declared of city cultural interest in 2014. In 2015 the company Telecom Argentina had made the money deposit which covered the total cost. Besides being the first Guide of the Zoo about its heritage, it is also the first proposal from a zoo framed within the cultural initiatives of the city.

Thus, from the Buenos Aires Zoo, research, educational and social actions are projected towards environmental conservation. For those reasons this publication has been included in the virtual library (available in: http://www.iaa.fadu.uba.ar/?page_id=8385) of the

international prestigious Institute of American Art and Aesthetic Research created in 1946 by the University of Buenos Aires by the architect Mario J. Buschiazzi, History professor in the School of Architecture of the Faculty of Exact, Physical and Natural Sciences. dedicated to research and historical and critical studies, theoretical demonstrations and materials habitat, design, architecture and the city, in Latin America and the Argentina, the Buenos Aires area and the city of Buenos Aires in particular.

Conclusion

Dynamics and characteristics of participation differ in form and content, their meaning is manifested in the need to shape the cultural development of communities. In the invention of new paths and the consolidation of the others a cultural process is built.

The Guide will be an input in the communication of this zoo park by offering an approach from a different perspective. Testimony of a culture and an era, linked to the history and memory, City Heritage and National Historical Monument, the BA Zoo must once again familiarize itself with their local citizens and it should be linked with their collective identity, in the rediscovery of their values. Knowing and appreciating are part of this process.

Through this work we expect to contribute to the recognition and communication of the cultural heritage. As an excellent opportunity of transferring the interest aroused by animal species to cultural goods and through them, enable the community to approach history, local urban evolution and the conservation of the environment from a different perspective.

marcelaldiazba@gmail.com mcf65@gmail.com

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Knowledge management for organizational learning; Intervention in the Educational Department of the Guadalajara Zoo.

LCC Cristian Livier García Zepeda

Department of Environmental Education / Mérida City Hall / México

Introduction

The organizations that work on environmental education must create efficient and innovative approaches, more than before. Knowledge Management is an approach that makes possible the creation and integration of knowledge for organizational learning, and from the creation of smart organizations we can give prompt response to the necessities of the continuity, innovation or problem solving.

As an example, we have the intervention project of Knowledge Management for Organizational Learning that we delivered at the educational centre located in the Guadalajara's Zoo in Mexico to renovate their practice of summer courses.

The Importance of Organizational Learning

For people who work on environmental education, achieving a change in how people perceive, value and act is our challenge and this is reflected in a better environment.

It is said that we live in the age of knowledge; Technology and the development of communications have put us in a world of information. However, as educational organizations we should not bet on the accumulation of information in our visitors, as this is not synonymous with knowledge or learning.

We must create efficient and innovative approaches. We face various challenges; either to ensure the continuity of our educational programs, to renew our practices or to solve problems. In organizations it is no longer enough for individuals to fulfill their tasks, but to solve problems, foresee, act, construct.

According to Senge (Senge, 2005), organizations commonly face problems that relate to an adaptive and generative disability. Overcoming these challenges requires specific knowledge, not only knowledge in the form of data, but also in ways of acting for the organization, which requires learning to learn in the organization itself. "Learning problems are tragic in children, especially when they are not detected. They are equally tragic in organizations, where they tend to go unnoticed" (Senge, 2005: 29). He bets on the generation of systematic thinking in organizations, he asserts that they can change their shared mental models, a phenomenon he has coined as *Metanoia*, described by him as "mental displacement or change of focus, transit from one perspective to another"

(Senge, 2005: 23). But how can an organization reach this point?

An Approach to Knowledge Management (KM)

Leticia and Sara Artilles Visbal state that KM "Is the system that organizes the external and internal information flows, propitiates the generation, appropriation, exchange and use of knowledge necessary for the increase of efficiency and quality in the fundamental processes of the Organizations."

In a simple way, we can use two main phases for organizational learning according to Fireston (Ortiz, 2009); Production and knowledge integration.

Knowledge production - are the processes through which new knowledge is created in the organization. It is synonymous with organizational learning, and focuses on improving the conditions in which innovation and creativity occur "naturally". (Ortiz, 2009: 8)

KM is not limited to production. In many organizations there is knowledge produced, for example process manuals, but they may be forgotten, obsolete or outdated artifacts.

Knowledge integration - are the processes by which an organization introduces new knowledge guidelines in its operational environment and removes the old ones. (Ortiz, 2009: 8)

The integration of this knowledge is based firstly on the power of human capital (Canals, 2003), individual capital can be converted into social capital through socialization through team learning, so that it becomes available to the organization.

Knowledge management can create what Senge calls an intelligent organization (Senge, 2005); an organization that learns and continually expands its capacity to create its future; "Is an area where people continuously discover how they create their reality. And how can they change it" (Senge, 2005: 22). In KM, human resources are the most important asset, recognizing the importance of people's knowledge, skills and attitudes within an organization, as well as its capacity for innovation and to mobilize cultural changes towards innovation based on the work within communities of practice. Generally, in organizations we have teams, but this is not the same as a community of practice, in which people share three characteristics: The domain (Shared competences)

The community (members interact and learn together), and The practice (shared repertoire

of resources) (Wenger, 2001). These communities provide the necessary innovation for the permanence of the organization, facilitate the integration of the participants through a pleasant atmosphere that in turn generates expectations, supports a collective memory and proposes solutions.

Intervention for organizational learning at Guadalajara Zoo (GZ)

As an example, we have the intervention project of Knowledge Management for Organizational Learning that we delivered at the educational centre located in the Guadalajara's Zoo in Mexico. Interviews with educators identified the need for renewal of educational programs and the incorporation of pedagogical concepts and tools, including evaluation. It was identified that there was enough unstructured or documented knowledge in the educators, and in general it was constituted in two dimensions; the one that refers to biological information that they have (explicit knowledge), and even more valuable, the one which refers to how they have produced and implemented mechanisms in which they make use of their skills and abilities in order to produce valuable environmental education for the public (tacit knowledge).

We worked on the renewal of a specific program: The summer course. This activity was recognized by them as one of their most successful practices from the high level of re-enrollment of visitors, and they were certain that this program brought interesting learning to the children, however, there was no evidence of their learning. On average, half of the children returned each year and because of this high recidivism was a program that could have a great impact on learners. Although continuing the same way of designing and delivering summer courses did not pose a threat to the organization itself (usually they had a well developed inscription, which ensured the continuation of the program), it was recognized that failure to renew courses with a more meaningful educational approach could have missed the opportunity to have a significant impact on these children.

An organizational learning intervention was designed that consisted of ten sessions. The objective was to analyse their own practices through a metacognitive process, integrating new pedagogical methods to renovate their practice of summer courses, and motivate the continuous innovation. This program –which is illustrated opposite - as well as the whole process was approved by the department director.

Results

New pedagogical knowledge was integrated, among others: Emotions in environmental education, a zone of proximal development, the development of programs based on realistic learning situations, dialogue and

imagination in education and continuous assessment.

Through the intervention, educators were able to design new summer course programs in a community of practice to promote strategies for learning environmental knowledge among children with the purpose of incorporating them into their lifestyle, and to influence the conservation of the environment.

At the same time, the intervention brought other positive results, such as the following.

Conversion of work team to community of practice.

Although not a specific goal of the intervention, the sessions also served as spaces for socializing, to recognize the skills of educators, to agree on ideas and to create a new identity as a group, reinforcing the characteristics of a community of practice that were mentioned previously. Even after concluding, they continued to work in a community by their own choice, convinced to work with greater integration. It should be noted that after the intervention, one of the educators decided to study the master's degree in education and knowledge management and is currently strongly supporting the work of the department to continue the integration of this approach.

Resignification of their practice. The educators expressed in several sessions their ideas, doubts and certainties about the direction of their work. Through dialogue in the sessions, a common sense of their practice was built and the importance of working in a community and educational innovation to implement realistic learning situations in visitors to the zoo, was generally rescued.

Expand the possibilities of their work. They recognized that they could undertake a variety of new activities in the summer courses by raising new goals, and in general the ideas emerged through thinking about the importance of contextualization. It was important to recognize that as children return year after year, they had a very great potential to observe the development in their long-term environmental training.

Metacognition. One of the main lessons learned was the recognition of their own knowledge and the skills they have developed from the experience of their educational practice; their pedagogical tact, in other words, they knew more about their own knowledge. This tact is a tool for the development of a successful educational practice, because having information or mastery over a subject does not ensure good teaching of it, the data is not enough, it takes the human tact to teach. Something curious was that although in practice they make constant use of this tact, in general this knowledge was so internalized that they were not aware. To make it explicit was important to make better use of these intentionally.

Construction of knowledge. Educators created specific knowledge that was validated by themselves as a community. These validated knowledge become

statements of knowledge once they pass from the individual to the organizational plane. Some of them are shared here.

- **Emotions.** Zoos awaken emotions in children; love, joy, indignation, uncertainty, fascination, curiosity, sadness, fear. Children show love for animals and for the park, joy when in touch with nature and companions, fascination and curiosity about animals, indignation when a person mistreats an animal, uncertainty, fear and sadness about extinction and death. They agreed that love was the most powerful emotion they could count on to teach and learn, love of nature, animals, the zoo, and even knowledge, as it enhanced the possibilities of learning and caring for what one loves. One of the agreed ideas was to put special emphasis on encouraging this emotion and distinguish that a key point would be through the rapprochement with nature.

- **Dialogue.** They built knowledge on the advantages of holding dialogue sessions in summer courses: brainstorming, feedback, evaluation, mediation, group integration, building trust, reaffirming knowledge, knowing the interests of children, mobilizing development, contextualization, group integration, establishment of rules of interaction, recognition of the mental maps of children, creation of common language and development of collective thinking.

The KM also has the advantage of few requirements to be carried out, it only takes the will, time, a manager and few materials. An invitation is made to integrate the KM in their workplaces to have smarter organizations.

Special thanks to the biologist María Eugenia Martínez for allowing the project to be carried out, to the educators of the educational department of the GZ for their enthusiasm and friendship, as well as the teachers Lorena Herrero and Maelvi Muñoz for their advice during the process.

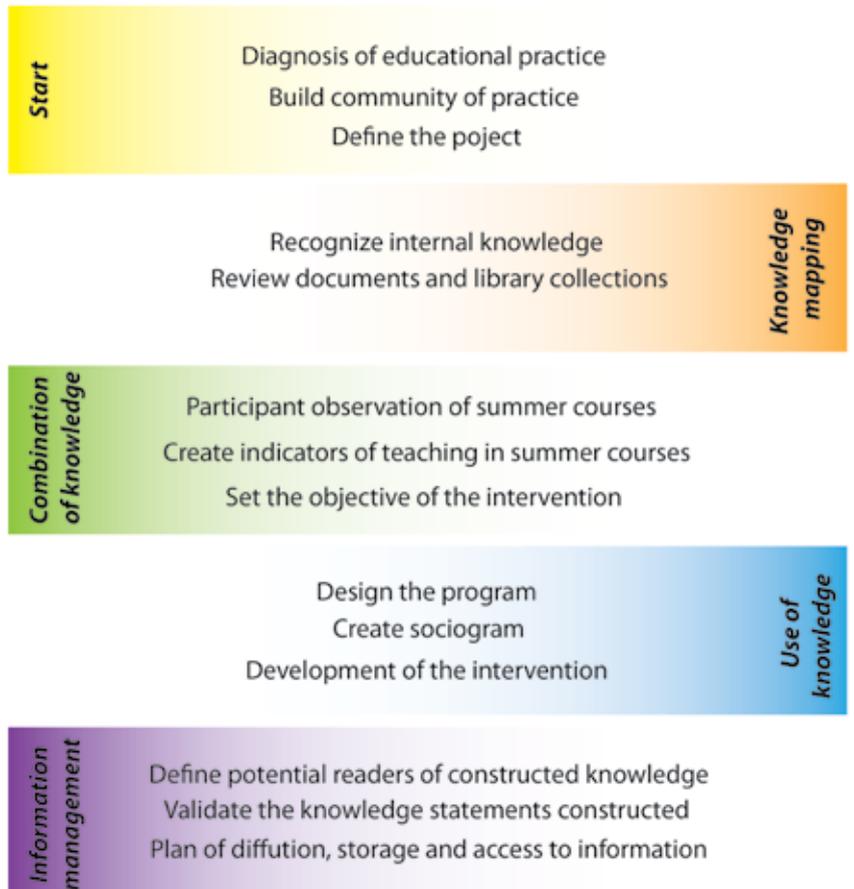
cristian.livier@gmail.com

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Why do adults visit zoos? Do they want to learn or have fun?

Mary Fitzpatrick

Norwood, Ohio, Miami University Project Dragonfly AIP Graduate Student

Introduction

The 2015 Pew Research Center study “Public and Scientists’ Views on Science and Society” found that both the public, and professional scientists, feel science plays an important role in improving the quality of life in America (Funk & Rainie, 2015). Despite this, most adults are scientifically illiterate (Oliver & Fergusson, 2007). Borchelt (2001) found that most adults are not equipped to integrate scientific thinking into everyday life.

Leisure learning venues like aquariums, museums, science centers, and zoos are areas where science learning takes place in a leisure setting (Dudzinska-Przesmitzki, & Grenier, 2008; Falk & Adelman 2003; Falk et al. 2016; Falk, Heimlich, & Bronnenkant, 2008; Falk & Storksdieck 2010; Kisiel, & Anderson, 2010; Knežević, Žučko, & Ljuština, 2016; Monroe, 2003; Morgan, & Hodgkinson, 1999; Packer, 2006; Packer & Ballantyne 2002; Roggenbuck, Loomis & D’agistini, 1990; Schwan, Grajal, & Lewalter, 2014; Taylor, 2010). Since these venues increasingly see education as an important part of their mission there is growing interest in studying science learning in informal settings. Bultitude & Sardo (2012) suggest that the relaxed atmosphere of leisure venues is especially important for reaching adults, who may be indifferent, or even resistant, to science education in formal education settings. Leisure learning venues are especially useful in teaching visitors how to interpret and evaluate scientific explanations of the world around them (Kisiel, & Anderson, 2010). They also increase public understanding of research, and change not only visitors’ level of knowledge of specific facts, but also their level of interest in how science works and their ability to think critically about science information in the media (Schwan, Grajal, & Lewalter, 2014).

Eighty-three percent of science professionals feel that funding is harder to secure today for political reasons. In the areas of food safety, water safety, and land use, most scientists feel that government regulations are not guided by the best available science (Funk & Rainie, 2015). Increasingly, Americans are asked to vote for candidates whose views on issues like climate change, and health care require some scientific



understanding. This disconnect between valuing and understanding science is problematic and may become more of an issue in the future (Durant, Evans, & Thomas, 1989). Aquariums and zoos often focus on conservation but have a role to play in engaging the public in all areas of science. They have an important role in teaching an understanding of science as a process and the sort of critical thinking that is most important in scientifically literate adults.

In North America, approximately 140 million people visit aquariums and zoos and every year, three quarters of them visit with children (Schwan, Grajal, & Lewalter, 2014). Given that most people visit leisure learning venues with children, almost all studies of learning in these venues, even studies looking at adult learning, involved family groups. Packer (2006), and Packer & Ballantyne (2002) excluded visitors with small children from their study population, but most others do not. There is a need for more research on adult learning in these settings (Dudzinska-Przesmitzki, & Grenier, 2008; Kisiel, & Anderson, 2010; Ogle, 2016; Schwan, Grajal, & Lewalter, 2014). Visiting a zoo with children impacts the quality and quantity of the learning adults experience. Adults typically structure the visit around their childrens’ learning needs, interests, and attention span rather than their own (Falk & Adelman, 2003; Falk & Storksdieck, 2010; Knežević, Žučko, & Ljuština, 2016; Morgan, & Hodgkinson, 1999; Packer, 2006; Packer, & Ballantyne, 2002; Schwan, Grajal, & Lewalter, 2014). In leisure venues adults learn in different ways than children (Dudzinska-Przesmitzki, & Grenier, 2008). Adults approach leisure learning with a

commitment to acquiring specific skills, or as a form of relaxation, but personal growth is always an important factor for adult free time learning (Dattilo, Ewert, & Dattilo, 2012).

Changing demographics are another reason to look at adults visiting leisure learning venues. In 1970 nineteen percent of US households were childless, or non-family, households; per 2012 US census data that number has increased to twenty nine percent (Vespa, Lewis, & Kreider, 2013). The percentage of households without children may even be higher than this data suggests, since some statistics still count empty nest households, where the children have moved out, as family households.

This study looks at adult visitors to the Cincinnati Zoo and Botanical Gardens (CZBG) who visited without children. It examines if adults without children expect to learn during their visit, and if the reason for their visit impacts either their learning expectation or their self-reported learning during their visit.

Methods

A short survey was developed using established survey categories so that results would dovetail with existing datasets. Six versions of the survey were created so that the order of answer options could be rotated. There is evidence that question order can bias participant response (McFarland, 1981). Paper survey forms were printed and shuffled to mix the versions and placed on clip boards with a pencil. Clip boards were given to visitors who agreed to take part.

Surveys were conducted at the exit to the Cincinnati Zoo and Botanical Gardens (CZBG) on four weekday afternoons in October 2016. Visitors exiting the Zoo without children were approached by researcher, who identified herself as a Miami University grad student doing research on adults who visit Zoos. Because adults without children are a minority of CZBG visitors all qualified adults were asked to take survey. When couples or groups of visitors agreed to take the survey, they were asked not to discuss questions or answers with each other until after finishing. When starting the survey, visitors were verbally reminded to only choose one answer for each question.

180 visitors were invited to take part in the survey, 59 refused, and 4 did not speak English. 12 surveys were later disqualified because they were incomplete or visitor had chosen more than one answer for one or more of the questions. This left 105 completed qualified surveys entered into Microsoft Excel for analysis. Chi-squared tests for independence were performed.

Results

The ages of survey respondents clustered into three groups, 37% were 18-30 years of age, 33% were 60+, and the other 30% was made up by all other age

Reason for Zoo Visit

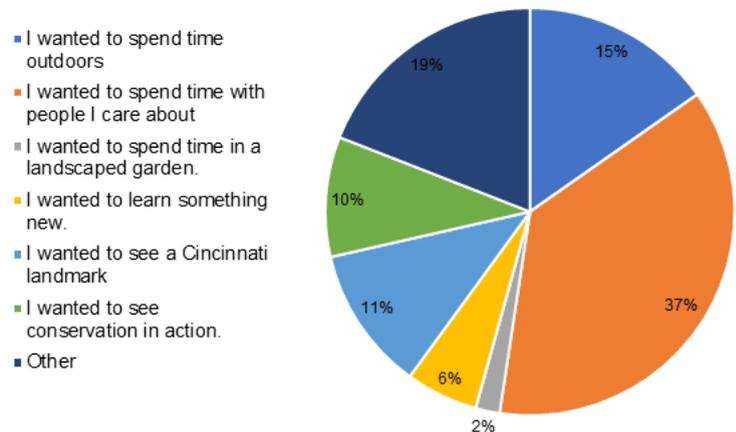


Figure 1 - reasons given for visiting the zoo

groups represented.

The main reason for visiting the Zoo among survey respondents was a desire to spend time with people they care about. (Figure 1). Only 6 respondents listed wanting to learn something new as the reason for their visit. A chi-square test for independence did not reveal a significant difference in self-reported learning between those who visited the Zoo because they wanted to learn something and those who wanted to spend time with friends.

94% of respondents reported they learned something on their visit, with 74% reporting they learned something new. Only 36% of respondents listed expecting to learn something as an important factor in choosing to visit the zoo, but 84% expected to learn something on their visit. When Chi-squared test for independence was run on these sets of answers the results suggest that for the participants in this study, anticipating learning something during their Zoo visit did influence actual learning. Five respondents did not report learning anything on their visit. All five reported that they did not expect to learn anything.

Respondents who reported they learned something on their visit said that they learned the most from reading exhibit signage. Personal observation was the second most common reason given for learning during this Zoo visit, and the most important reason given in respondents over fifty.

Discussion

At the time of this study the CZBG had no data showing the percentage of visitors who come without children, but single adults account for only 5.1% of memberships (T. R. Amrine, personal communication November 8, 2016). Due to the small sample size and because data collection took place during the week thus excluding adults with standard working schedules from the data set, this project can only be considered a pilot study. However, it does show some interesting preliminary



insights into learning by adults on child free visits to the CZBG.

Visitors over sixty were the largest demographic group among respondents. Individuals between 18 and 29 were the next largest group. Vespa, Lewis, & Kreider (2013) found that young adults who have delayed starting families and single older adults account for most childless households in America. Garikapati et al. (2016) found that in addition to millennials delaying starting families, baby boomers retiring and becoming empty nesters are an important factor in the rise of child free households. It is not surprising that these two groups made up most of the survey population.

Despite "I wanted to spend time with people I care about" being the number one reason respondents gave for their CZBG visit, 84% of them anticipated learning something while at the Zoo. Entertainment is often seen as the primary reason to visit a zoo (Knežević, Žučko, & Ljuština, 2016; Morgan, & Hodgkinson, 1999; Packer 2006; Packer, & Ballantyne, 2002). Social contact and entertainment are major reasons adults take part in formal leisure learning activities. (Dattilo, Ewert, & Dattilo, 2012). Pine & Gilmore (1998) suggest that our economy is changing from one based on providing goods and services to one providing experiences. Visitors to informal leisure learning venues may choose to visit these types of institutions because they see learning as a fun experience (Falk & Adelman 2003; Falk et al. 2016; Falk, Heimlich, & Bronnenkant, 2008; Falk & Storksdieck 2010; Kisiel, & Anderson, 2010; Morgan, & Hodgkinson, 1999; Packer. 2006; Packer, & Ballantyne; Roggenbuck, Loomis & Dagistini, 1990).

Adult free choice learners like to set their own pace and interaction path on their visit (Falk & Adelman, 2003; Falk et al. 2016; Falk & Storksdieck 2010). It is not surprising then, that exhibit signage and personal observation were given by respondents to this survey as the interactions most important to their

learning experience. Ogle (2016) found that adult zoo visitors sought out static signs to find answers to specific questions brought on by personal observation. All five respondents who reported learning nothing had not anticipated learning during their visit. The other eleven who had not anticipated learning did feel they had learned something. Falk, Heimlich, & Bronnenkant (2008) reported that those who had the least expectation of learning had the greatest increase in their understanding of issues like conservation because of a zoo visit.

Conclusion

This study found that adults who visit the Cincinnati Zoo and Botanical Gardens without children primarily came to the zoo for social reasons.

Despite only six percent listing learning as the reason for their visit, almost all respondents to the study felt they learned something while at the Zoo. Packer & Ballantyne (2002) suggest that the experience of learning is strongly tied to visitor satisfaction with visits to leisure learning venues.

Further inquiry is needed into specifically where learning differs between adults with children, and adults on their own, at leisure learning venues. Changes in the U.S. population suggest that the number of adult only households are increasing. Learning is one of the reasons adults choose to socialize at zoos or aquariums. Understanding where, how, and why that learning takes place is important not only for these institution's educational mission, but for their future existence.

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Author E-Mail fitzpamp@miamioh.edu

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Teen Volunteers at the Zoo: Education Goes Beyond Conservation

Colleen Bowman

Educator, San Diego Zoo, U.S.A.



Introduction

Teen volunteer programs at zoological institutions can be a powerful way to share stories of conservation and to educate zoo guests. Although it is typically not a focused outcome of these programs, participant social and professional development can be a secondary gain that serves both the student and field of environmental conservation. A program at the San Diego Zoo entitled “Zoo Corps,” serves as an example of these potential benefits to both participants and wildlife, while creating a case for implementing teen volunteer programs at zoos around the world.

Teen Involvement at the San Diego Zoo

Since 2002, teenagers have had the opportunity to get involved at the San Diego Zoo through a volunteer program entitled “Zoo Corps.” Zoo Corps is intended for students ages 13-17 and has a goal of providing teens with an opportunity to share their passion for wildlife and conservation with zoo visitors. As the program has grown and developed over the years, it has become a prime example of the San Diego Zoo’s hope of creating the next generation of leaders in wildlife conservation. Participation is popular among local teens, and competition to join the program is high. Due to staff and resource demands, and to ensure that participants are dedicated to volunteering, each

applicant must complete an application, essay, and group interview.

Once selected, participants are committed to volunteering at least one weekend day a month for a shift lasting six hours, with a 30-minute break period for lunch. These monthly volunteer shifts are called “kit days.” On their kit day, students spend half their shift attending a zoo-educator led workshop focused on building skills related to public speaking, teamwork, social interactions with guests and peers, leadership, and building their wildlife conservation knowledge. After the workshop concludes, the students are responsible for working as a team to set up “kits” throughout the zoo. These kits contain biofacts, posters, interactive games, puppets, and other elements that help them educate zoo guests on four main topics: sustainability, animal welfare, local habitats, and San Diego Zoo Global conservation projects.

Education & Public Speaking

When inquiring about the Zoo Corps program, the most common question is in regard to animal experience. Many want to know if the program is a first step to becoming a zookeeper, and are sometimes disappointed to find out that program participation does not involve working with animals. Zoo Corps is a program that thrives on a collective passion for environmental conservation, and is targeted to teens “who have an interest in wildlife,

education, or public speaking” (San Diego Zoo, 2016). The goal of Zoo Corps is to create environmental stewards that pass their knowledge and love for wildlife conservation to zoo visitors, “inspiring a change for a better tomorrow” (San Diego Zoo, 2016). Over a five-month period, each Zoo Corps program session incorporates educator-led workshops that teach public speaking techniques. These workshops are intended to help students build a specific skillset that will set them up for successful conversations with groups of all sizes and all ages. Skills taught differ each session, but include ideas on tailoring information based on audience, tools for teaching children, presentation structure, and the power of positive messaging. Through peer presentation and group discussions, teens practice these skills before implementing them in front of zoo guests.

Throughout each session, growth in participants is evident. Participants become more confident with their public speaking abilities and ability to communicate effectively with peers and strangers. This growth is commonly translated to participants’ lives outside of the program, based on personal testimonials and accomplishments that participants choose to share with Zoo Corps staff members. Participants’ level of interest regarding wildlife conservation is also evident, as Zoo Corps members share stories about how they have become environmental stewards in their own households.

Fringe Benefits

There is evidence of extra benefits to participation in Zoo Corps programming through observations of student interactions. Each kit day, participants work with 12-15 other students they may have only encountered on the first day of volunteer training. This adds an unknown element to each day of volunteering, and challenges them to become comfortable working with different peers each month. This challenge leads to visible growth in social skills, student confidence, and social and self-awareness.

Knowing that the Zoo Corps program develops an individual’s public speaking skills, many participants are selected for the program even if they did not have the most confident interview. When comparing a participant’s first day in the program to their last, an upswing in their confidence and ability to handle new situations is apparent. Not only do they engage more often with guests in the zoo, but they speak up during workshop and handle presentations confidently in front of peers. The possibility for this to translate outside the walls of the program is endless. From school presentations to confidence in job or college interviews, the participants are hopefully learning how to carry themselves in real-world situations and in a professional manner.

With teenagers increasingly absorbed in technology, Zoo Corps kit days provide participants with an unplugged experience with actual social interaction. Participants must actively communicate throughout the day to share ideas, develop presentation plans, and provide a quality experience for zoo visitors by facilitating discussions in a professional and informative manner. Throughout their presentations, participants must learn how to share the floor and support one another in a way that leads to mutual success. Zoo Corps members also learn how to receive feedback from staff members, both positive and constructive, and implement that feedback in future presentations. Most importantly, participants must learn how to give and receive feedback, both to and from their peers. While uncomfortable at first, this skill develops throughout the session with the intention of increasing the ability for participants to learn and adapt each kit day.

Through this process of feedback, students learn how to assess their own behavior and become more self-aware during their presentations and interactions with peers. It is common for participants to not realize when they interrupt their fellow participants, or take on a leader/follower role each kit day with little variation. Receiving positive and constructive feedback frequently throughout the session helps participants get used to a process that will continue into their adult working and personal lives. The goal of feedback is to not only be transparent and encourage growth, but is to give each participant the ability and aptitude to receive feedback from professors, employers, and other superiors in the future.

More than Conservation

While the Zoo Corps program at the San Diego Zoo has yet to be formally evaluated, benefits that exceed beyond an increased knowledge of wildlife conservation is supported by previous research. In 2009, authors Jonutyte and Rekis evaluated teen motivation for participating in volunteer activities with non-profit institutions. The authors found that teen volunteers are motivated based on their interest in the subject matter, and participation in the programming increases a student’s psychological knowledge and social skills (Jonutyte & Rekis, 2009). A more recent study by Navickas, Simkus, and Stunz (2016) examined the impact that volunteering has on the life quality of teens. The authors found that students self-reported a variety of benefits similar to those seen in Zoo Corps participants: an increase in confidence, communication skills, interpersonal skills, and professional mannerisms (Navickas, Simkus, & Stunz, 2016).

The Zoo Corps program is just one example of how a teen volunteer program can enrich zoological institutions, while having a multitude of positive impacts on participants. While conservation education is

the primary reason to celebrate and advocate for these programs, secondary benefits can create a strong case for community engagement and development. The idea of bringing students together from diverse backgrounds to contribute toward a common goal of conservation can be a powerful tool in the development of teenage social skills and self-awareness. While creating a volunteer program may not be feasible for all institutions, Zoo Corps can serve as a model to those who are interested in a similar program for engaging youth in a community. Teenagers are excellent stewards for wildlife and conservation, and a structured and supportive volunteer organization can be an asset to zoological missions and to the teens themselves. By providing participants with an outlet and opportunity to practice skills and share their passion for conservation, the next generation will learn how to advocate for the environment and world that we all share.

Moving Forward

The understanding of outcomes from participation in the Zoo Corps program would benefit from being formally evaluated. A formal evaluation process would also support future initiatives for the program. Through summative assessments, short term outcomes and benefits could be evaluated through a pre- and post-test model, similar to teen program research conducted by Owen, Murphy, and Parsons in 2008. While the results would prove worthwhile, the most valuable information would come from long term assessments of participants. The Zoo Corps program would benefit from reaching out to past volunteers and inquiring about skills developed in the Zoo Corps program, and how they believe those skills translated into their adult lives. Authors Griffin et al. (2016) conducted a long-term evaluation on teenage environmental camp participants and the outcome participation had on their interest in wildlife and future careers. Conducting a similar evaluation for Zoo Corps would be valuable for shaping the future of the program and building on intended outcomes.

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Colleen Bowman is an Educator at the San Diego Zoo in San Diego, California, cbowman@sandiegozoo.org.

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