Evaluation Tools for Educational Programs at

Michael Clark, Erin McConnaghy, Nicole Packard & Brian Peterson

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Report submitted to:
Paul Davis, Advisor
Joan Szkutak, Advisor
David Szkutak, Advisor
Cyrelle Field, Project Liaison
Phoebe Lynch, Project Liaison

Abstract

Zoos Victoria recently introduced a new educational program, Education for Conservation (EfC), to teach visiting students about conservation practices. Our goal was to create a set of efficient tools to assess the effectiveness of EfC from the perspectives of Zoo educators, schoolteachers, and students, because they had no previous form of standardized evaluation. We developed focus groups and self-reflection journals to gauge educator satisfaction, surveys to measure teacher expectations, student pre-visit and on-site activities to assess student engagement, and observation sheets to simultaneously evaluate the engagement of all three groups. The implementation of these tested tools provides Zoos Victoria with a means to continually evaluate and improve the EfC program.

Acknowledgments

We would like to thank Cyrelle Field, Phoebe Lynch, and the rest of the Zoos Victoria Learning Experiences staff for such a great experience over the past eight weeks. Thank you for all of the continued support and help throughout the project. You truly welcomed us into the Learning Experiences team and made us feel at home! We would like to extend a special thanks to Mark and Andrew, of the Melbourne education team, for going above and beyond by getting us memorable interactive animal experiences. Getting a chance to feed the kangaroos and giraffes, in addition to playing with the lemurs, are experiences that we will cherish throughout our future. We loved the daily quizzes at lunch and all of the other entertaining distractions. You all kept us sane over the course of our project, and we could not be more grateful for that.

We would also like to thank our project advisors, Joan & Dave Szkutak and Paul Davis, for their support in our project. Thank you for all of your constant feedback and guidance throughout the term. Though we all complained at points along the way, thank you for always pushing us to reach our greatest potential.

The road to the end of the project was a bumpy one, with many twists and turns. Getting to the Zoo on our first day involved an unexpected journey to East Footscray (one hour from the Zoo). Many times throughout the term we were visited by the giggle monster (who hit everyone except Mike, who hates having fun but loves giving Erin “the look”), but we always got the work done in the end. The constant struggle to stay connected to the public Wi-Fi was one that can be compared to trying to cuddle with a wombat...good luck! This led to many powwows in the Bistro, which really took a toll on our wallets because we continually felt the need to buy hot chippies. Finally, we would like to thank each other, for such an enjoyable experience, with memories that we will never forget. - [Long live BMEN]

Executive Summary

Dozens of wildlife species go extinct each day, and 30-50% of all species may be extinct by mid-century (Center for Biological Diversity, n.d.). Wildlife conservation efforts are focused on protecting endangered species and their habitats to prevent extinction (Sanford 2014). A goal of Zoos Victoria (ZV) is to encourage a lifelong commitment to conservation of wildlife among visitors by highlighting environmental sensitivity and emotionally connecting visitors to wildlife (Zoos Victoria, 2015).

Zoos Victoria uses its educational program, Education for Conservation (EfC), to teach visiting students about conservation initiatives. This program is designed to encourage student learning at the Zoo but shortens the educational time Zoo educators have with students. The EfC program encompasses three key groups: visiting students from local schools, schoolteachers, and the Zoo educators.

Project Goal and Objectives

The goal of our project was to provide ZV with a set of evaluation tools for assessing the effectiveness of the EfC program because it previously had no means of evaluation. We sought to assess three aspects of EfC:

- Sustainability of EfC from Zoo educators' perspectives,
- Fulfillment of schoolteachers' expectations,
- Student engagement and learning outcomes.

Evaluation of these three areas is crucial to the success of ZV's educational program. These evaluation tools needed to place minimal administrative burdens on the ZV staff and educators as well as on the visiting schoolteachers and students. To achieve our project goal, we examined all three groups utilizing a variety of methods to determine the optimum tools for ZV to use for ongoing evaluation of EfC.

Methods Overview

We began by shadowing the Zoo educators to gain a better understanding of the various educational programs. We then distributed pre-visit surveys to visiting schoolteachers to gain more insight into their expectations. Next, we observed education sessions, where we were able to look at Zoo educators, schoolteachers, and students simultaneously to determine if there was a correlation among all three groups.

We used the information gathered from these three methods to progress into student tracking, interviews, post-visit surveys, and focus groups. In student tracking, we observed what students were doing and where they were going. Zoo educator and schoolteacher interviews were utilized to learn more about educators' and teachers' common concerns. Schoolteacher post-visit surveys were used as a comparison to the pre-visit survey data to see if teacher expectations were met and if the EfC program was impactful. Finally, we finished with Zoo educator focus groups in which educators were able to critically reflect on the past week and discuss concerns with each other.

Key Findings, Recommendations, and Conclusions

Our research demonstrates that an effective and efficient process for evaluating Zoos Victoria's (ZV) Education for Conservation (EfC) program incorporates four key elements:

1. *Zoo Educators: Focus groups in Tandem with Critical Self-Reflection Journals*

Focus groups, utilized at the end of each school quarter, provide Zoo educators with a safe space to collectively discuss their concerns and experiences. Weekly self-reflection journals help the educators reflect individually as well as prepare for the quarterly focus group. Most importantly, educators can discuss their strengths and weaknesses and offer advice to help one another. After such a session, one educator said, "I feel like we've purged," expressing the common consensus

that the focus groups were beneficial in allowing them to share their emotions and thoughts on the EfC program, an experience they had never had in a group setting. During these focus groups, Zoo educators explained that they now recognized the importance of self and group reflection and agreed on the need to put aside the time to complete this exercise.

2. *Schoolteachers: Pre- and Post-visit Surveys*

Our approach to sending 200 pre- and post-visit surveys to visiting teachers produced a 28% response rate. The optimal time to send the surveys is 12:00 PM, one week before and after the Zoo visit. The pleading tone of the email requesting the surveys likely aided in the high response rate. We determined that pre- and post-visit surveys were an efficient tool for data collection, since they provide insight on teacher expectations and desired learning outcomes. We recommend that pre- and post-visit survey responses be compared to each other to gauge if schoolteacher expectations are being met.

3. *Students: Pre-visit and On-Site Activities*

We found that pre- and post-visit student drawings were ineffective at measuring student learning. Hence, we recommend testing other pre-visit and on-site activities. Our research into activities used at other zoos identified two activities to be tested. The pre-visit activity would introduce specific animals at the Zoo, and the on-site activity would encourage students to find these animals. The addition of pre-visit and on-site activities would help students prepare for their visit and increase participation, allowing them to get the most out of the educational sessions and Zoo visit as a whole.

4. *All three groups: Observation and Tracking Sheets to Measure Engagement*

Simultaneous evaluation of all three groups can be accomplished by observing the engagement of students, participation of schoolteachers, and satisfaction of Zoo educators during educational

sessions; results are recorded on observation sheets we designed. Simultaneous observation of all three groups provides ZV with an efficient and effective tool for ongoing evaluation of the EfC program. We recommend that the observation form be revised to accommodate any new common themes that appear. We also recommend that these observations and tracking be completed over a two-week period once each year.

We are leaving Zoos Victoria with practical, efficient, and effective tools for ongoing evaluation of the EfC program. Zoos Victoria and other zoos can use these tools to assess (and hopefully increase) the impact of their conservation programs. Our approach to ongoing evaluation will also provide Zoo staff and educators with professional development, which leads to higher job satisfaction and ultimately organizational growth.

Authorship

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	Abstract	**All**	**All**
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1.0 Introduction

Dozens of wildlife species go extinct each day, and 30-50% of all species may be extinct by mid-century (Center for Biological Diversity, n.d.). Efforts are being made in wildlife conservation, which focuses on protecting endangered species and their habitats, to prevent extinction (Sanford 2014). Zoos Victoria (ZV) is one organization that aims to spur a lifelong commitment to conservation of wildlife by highlighting environmental sensitivity and emotionally connecting visitors to wildlife (Zoos Victoria, 2015). Zoos Victoria encourages participation in wildlife conservation through various hands-on programs, such as Seal the Loop, where people are encouraged to place used fishing line in boxes located at Victoria beaches. Programs such as these encourage people to make changes to their daily life and begin supporting conservation efforts.

Zoos Victoria connects over 150,000 students each year to its conservation work (Zoos Victoria, 2015). Through their active educational program, Education for Conservation (EfC), ZV educates visitors about conservation and preservation of wildlife through the encouragement of learning throughout the day. Currently, the level of impact and effectiveness of ZV's EfC program is not being evaluated. The EfC program deals with three key groups: students, schoolteachers, and the Zoo educators. ZV decided this new EfC program should be evaluated to ensure that students are learning and engaged, schoolteachers' expectations and educational goals are being met, and to determine if the program is sustainable from the educators' perspective. Ensuring that all three of these areas are evaluated is crucial to the success of ZV's educational program.

Previously, no common evaluation tool existed to measure the success of the EfC program. The goal of our project was to provide ZV with a set of evaluation tools for assessing

the effectiveness of their educational programs. These tools needed to place minimal administrative burdens on the ZV staff and educators, as well as the visiting schoolteachers and students. To achieve our project goal, we established that all three key groups needed to be evaluated. The combined efforts of our methods will allow for a more accurate evaluation of the educational programs instituted at Zoos Victoria. Our project provided ZV with four key evaluation tools which will aid them in efficiently assessing their Education for Conservation program:

- focus groups and self-reflection journals to assess the sustainability of Zoo educators' demanding role in EfC
- Surveys to gauge schoolteachers' expectations
- Pre-visit activities for students for Zoo preparation
- Observation of the collective engagement of Zoo educators, schoolteachers, and students.

2.0 Background

2.1 The Role of Zoos in Education

2.1.1 The Purpose of Conservation Education

Zoos play an important role in educating the public on the mass extinction of wildlife across the globe. Currently, the world is in the process of losing half to three quarters of all land and animal species over the next four generations of human life (Wilson, 1992). Therefore, conservation education is needed to influence the public to make changes in their current habits by informing them about current conservation issues. Through conservation education, people begin to better understand how their actions affect wildlife and how simple changes can help protect animal habitats. Conservation education helps people develop lifelong skills, awareness, positive attitudes, and behaviors towards preservation of wildlife and natural resources (Patrick, Mathews. Ayers, & Unnicliffe, 2007). Zoo educational programs are just one of the many things that have the potential to bring about lifestyle changes that will positively impact wildlife conservation efforts and promote lasting commitments to fighting wildlife extinction.

2.1.2 The Role of Zoos in Society

Zoos and institutions, such as aquariums and museums, have a strong influence in the field of conservation education. “Zoos...play a vital role in educating over 175 million visitors and 12 million students in the classroom or in the field about wild animals, their habitats, their related conservation issues, and the ways in which they [the visitors and students] can contribute to their preservation” (Association of Zoos and Aquariums). In more recent years, zoos’ goals have changed because of their new awareness surrounding wildlife habitats around the world (Miller et al., 2004). To mediate the issue of habitat destruction, zoos have altered their programs

to provide visitors with education on conservation and wildlife preservation (Miller et al., 2004), which has led to new educational programs for students to experience. While conservation is crucial, zoos must also participate in other key areas, especially education, in order to remain functioning at a high level in society.

Zoos in the 21st century have four main objectives: conservation, education, entertainment, and research. Through these objectives, visitors can learn about different animals and how they, as individuals, can contribute to the preservation of endangered species through facilitated educational interactions (Carr & Cohen, 2011). Studies have shown "that school field trips can be important for enhancing school children's science learning by giving them authentic experiences, direct contact with real objects, and stimulating their curiosity and interest in the topic" (Davidson, Passmore, & Anderson, 2009). Zoos play an important role in forming such connections between visitors and Zoo objectives. A more in depth description of zoo's roles in society is shown in *Figure 1*.

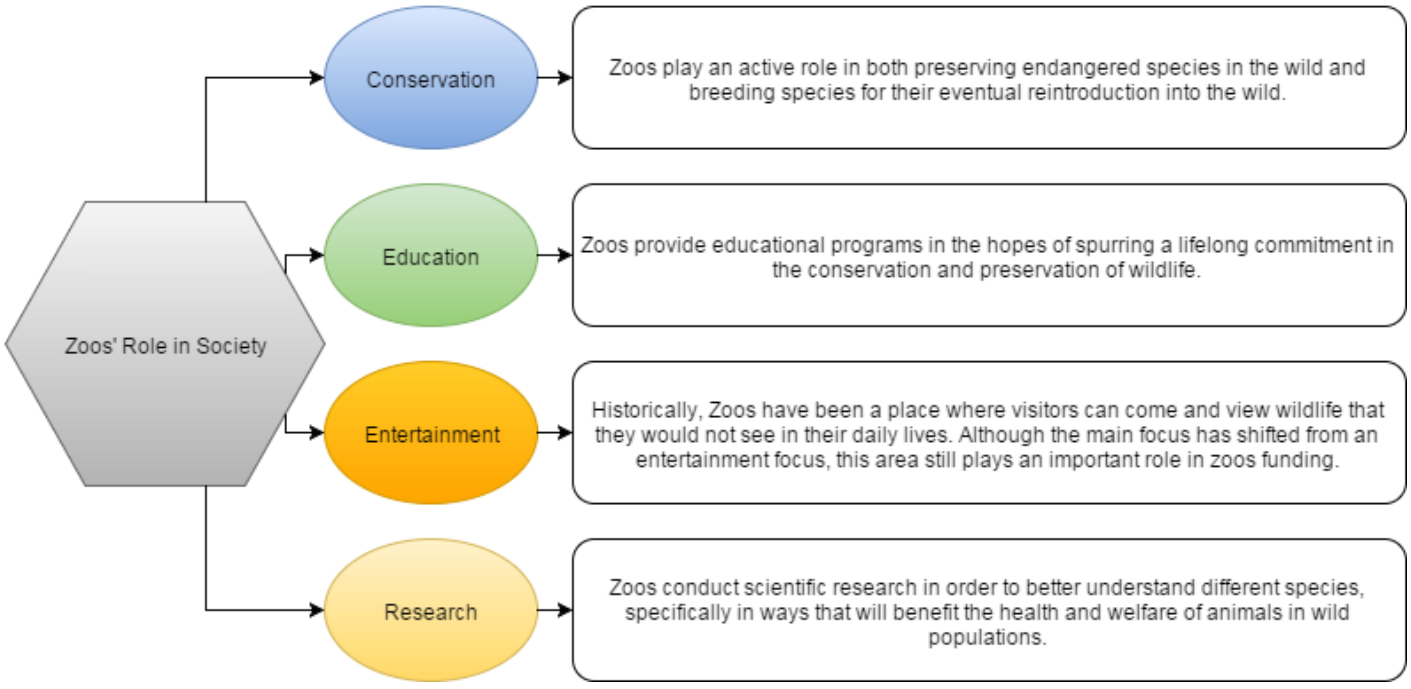


Figure 1: Zoos' Role in Society (Carr & Cohen, 2011)

2.1.3 Conservation Education at Zoos

In regards to education, it has been found that a passive approach, such as hoping visitors will read the posted signs at exhibits, is an unsuccessful method of education. This is because visitors often spend minimal time reading the posted information and leave with misconceptions (Miller et al., 2004). This method of education was more common in the beginning of conservation education efforts, but more contemporary methods have evolved to include a more active approach.

Conservation education can be best completed through active learning, such as hands-on activities that allow students to participate (Zhou, Purushothaman, & Rongbutsri 2013). Recently, zoos began implementing active learning programs that focus on increasing engagement throughout the day. In order to do this, zoos utilize a problem-based learning approach, establishing wildlife conservation as a major issue and providing a starting point for the learning process (Zhou, Purushothaman, & Rongbutsri 2013). Active learning styles in conservation activities strive to develop a bond between the visitor and wildlife, emotionally connecting visitors with the information they are provided (Swanagan, 2000). This manner of teaching provides a context for education by identifying a meaningful issue and presenting it in a way that effectively impacts students on an emotional level.

Zoos have been greatly beneficial to the overall conservation movement because they have the ability to reach a massive audience. With around 600 million people visiting annually, zoos are the perfect location for public education and carefully managed conservation based wildlife encounters (Tribe & Booth, 2003). Students and schoolteachers make up one core group of the visitors who go to zoos for classes, tours, and outreach programs (Patrick, Mathews,

Ayers, & Unnicliffe, 2007). Because of this, it is important for zoos to regularly assess the satisfaction of the students and teachers.

Previous research completed at Zoos Victoria shows that about 60% of school groups visit zoos for entertainment, while about 40% visit for academic reasons (Hoey, Miralda, Tomkinson, & Tymon, 2012). This makes it virtually impossible for a zoo to be solely academic based; it must continue implementing its pre-existing element of entertainment. Regardless of visitors' reasons for attending, the most common source of income for zoos is usually the visitors' fees (Carr & Cohen, 2011). Because visitors often visit zoos for the purpose of entertainment, zoos must continue providing exciting exhibits in order to thrive financially and develop their education efforts.

Through modern educational methods that include a more visual and active style, zoos are spreading their conservation beliefs to more people every year. Zoos' active-learning programs are providing the perfect platform for delivering information about conservation issues, thereby appealing to visitors' emotions and making the message more impactful and long lasting.

2.1.4 Importance of Zoo Education Program Longevity for Evaluating Education

To achieve long lasting changes, the educational programs at zoos must be feasible and long lasting. Without program sustainability, it is impossible for zoos to carry out their mission of improving wildlife conditions across the globe. Encouraging community involvement and support for wildlife conservation contributes to the sustainability of the zoo's programs (Loh, Friedman, & Burdick, 2013). After making visitors aware of conservation issues, zoos can challenge them to make changes to their lifestyles, such as cutting the loops on plastic soda holders, which enhance protection of wildlife and the environment (Zoos Victoria, 2015). This leads to long-term changes in behavior, which ensures the future success of Zoos' education

efforts. However, zoos must regularly evaluate their programs to ensure that they continue to be effective. Ongoing evaluation is an important tool that can "improve and expand the [program] by using data gathered about [program] processes and outcomes" (Loh, Friedman, & Burdick, 2013). Evaluation provides the user with different sources of information, such as statistical data or observations, which can help them to better understand the pros and cons of their program. As defined by Dr. Weiss in 1998, "evaluation is the systematic assessment of the operation and/or outcomes of a program or policy, compared to a set of... standards, as a means of contributing to the improvement of the program" (Thomson & Hoffman, n.d.; Weiss, 1998). Should participants feel the programs are not up to their standards, assessment of the program will be necessary to implement change. One must determine what type of evaluation to use, because different education styles call for different evaluation styles (Thomson & Hoffman, n.d.; Weiss, 1998).

2.2 Importance of Evaluating Education

2.2.1 The Need for Evaluation at Zoos

Evaluation is necessary to ensure the success of the different educational programs offered at zoos. In order to achieve their desired goals and outcomes, zoos need to measure the impact of their programs on people's attitudes and behaviors (Tribe & Booth, 2003). This data is gathered to make adjustments to their educational programs and address possible structural flaws. Evaluating educational programs at zoos ensures that they are providing compelling and practical information to visitors.

Furthermore, evaluation at zoos is particularly difficult because there are many different obstacles that stand in the way of measuring the success of their programs. Zoos have difficulty assessing the impact of their programs because they "find themselves having to defend external

challenges to their educational effectiveness without the necessary evidence to do so" (Moss & Esson, 2012). Zoos make broad claims about what role they play in conservation education, and they are often criticized for not being able to justify their assertions (Moss & Esson, 2012). Zoos need to have empirical evidence to support the claims they make in their mission statements. Without a finished product (in this case, a refined educational program), all the advertising in the world is meaningless (Fetterman, 1988). Without assessing the impact of the institution's initiatives, they cannot be sure if their mission is coming to realization.

2.2.2 Types of Evaluation

The three types of educational models: informal, non-formal, and formal, each have unique evaluation styles. Informal and non-formal learning, which are generally employed in zoo settings, refer to learning outside of an educational setting, where learning is not based on specific curriculum and the educational outcome is independently determined. Non-formal learning is typically not evaluated due its unstructured nature (Diamond, 1999; Corlardyn Bjornavold, 2004), and this is part of what makes the evaluation process at zoos so important. Since each style of education necessitates a different style of evaluation, it is important to have an understanding of each type of education and its role. Please refer to *Table 1* for a more detailed description of these models and their evaluation styles, as it explains the differences between each education type and lists the corresponding evaluation style.

Education Type	Information	Evaluation Style
Informal	-Voluntary and self-directed learning -Motivated intrinsically, through curiosity, manipulation, fantasy, task completion, and social interaction -Most common type of education style	-Qualitative -Quantitative -A combination of the two can be more effective
Non-Formal	-Correlates with informal and formal learning -Intentional learning -Typically occurs outside of school -Structured and pre-arranged -Can be self-guided or teacher-led	-Not typically evaluated
Formal	-Structured and pre-arranged learning -Leads to an end goal (such as a diploma) -Teacher-led -Considered repressive by some; it is too structured for growth	-Tests -Grades

Table 1: Education Styles and Corresponding Evaluation Types,
Adapted from Diamond, 1999, Eshach, 2007, and Colardyn & Bjornavold, 2004

In Judy Diamond's Practical Evaluation Guide, she discusses three different evaluation types: front-end, formative, and summative. Front-end evaluation focuses on acquiring information that will allow for future program improvements. This can be done through the use of surveys, interviews, observations, and behavioral assessments. The desired outcome of a front-end evaluation is to have a clear understanding of the evaluated subjects. The information can then be applied in the creation of a new program designed to meet the expectations of the target audience (Diamond, 1999). The second type of evaluation, formative evaluation, is used to gather information for the advancement of an existing program, despite the fact that the program has not been fully developed. This method focuses on observing visitors to see their reactions to the current educational model, and how the program can improve based on visitor feedback (Diamond, 1999). Lastly, summative evaluation is used to measure the impact of a completed

project, in order to allow for future improvements. Summative evaluation uses a variety of evaluation tools, from basic to advanced measures, such as attendance numbers and discovering what attendees learned from a program (Diamond, 1999). As applied to zoos, all three types of evaluation can be implemented, depending on the stage of development of an educational program.

2.3 Case Studies Supporting Evaluation Methods

2.3.1 Educator

Educator Shadowing and Observations

Qualitative analysis, such as taking open-ended notes during staff or visitor observations, provides data for evaluation of participant experiences. "Observations, interviews, and focus groups produce descriptive data that are analyzed qualitatively" (Randi Korn & Associates, Inc., 2014). Observations, such as those conducted at the Bronx Zoo, can gather data "about how visitors used and experienced the various activities and programs" (Randi Korn & Associates, Inc., 2014). An evaluator at the Bronx Zoo studied the data for patterns and grouped similar responses in order to develop themes (Randi Korn & Associates, Inc., 2014). Qualitative data, such as that gathered at the Bronx Zoo, can also be used to understand observed behaviors. Common themes, attitudes, and behaviors can be used to refine a set of topics for further discussion, in settings such as focus groups or interviews.

Educator Focus Groups and Interviews

Focus groups and interviews differ from observations because they set out to gather information from people verbally instead of textually or visually (Baara, Gile, Kennedy, Santoro, & Vresilovic). The Australian Museum is one location that implements focus groups. "Focus

groups are a qualitative method of social science research widely used… in sociology, [and] political research and management" (Kelly, 2010). Focus groups, when used for front-end and summative evaluation, use in-depth discussions with small groups about various topics to gain a better understanding of themes, concepts, content understanding, and satisfaction. Focus groups are a good method to use to evaluate satisfaction because they "can uncover and explain issues and reactions which may not be expected, anticipated, or even surfaced during general quantitative surveys, questionnaires, or telephone polls" (Kelly, 2010).

In addition to focus groups, interviews are also effective tools for collecting information. The National Aquarium in Baltimore, Maryland is a location that has implemented various types of interviews. The aquarium used pre- and post-visit in-person interviews as well as telephone post-visit interviews. By completing an analysis of the data collected from these interviews, the evaluators were able to gain an understanding of visitors' knowledge on conservation as a concept (Adelman, Falk, & James, 2010). As applied to zoos, questions can be focused in ways such that interviews can be a means of understanding how educators are feeling, what they have been doing, and how various aspects of their day have been affecting them. Additionally, questions can be focused in a way to learn about teacher expectations.

2.3.2 Teacher

Teacher Surveys

Surveys are a means of gathering data and information and are the method most commonly used by museums. Researchers from the Smithsonian Institution spoke with various research organizations and found that 80 percent of these organizations sent surveys to schoolteachers about once a year, resulting in a response rate of over 50 percent (Smithsonian Institution, 2014). Although this is an effective way to evaluate teacher opinions, when two fifths

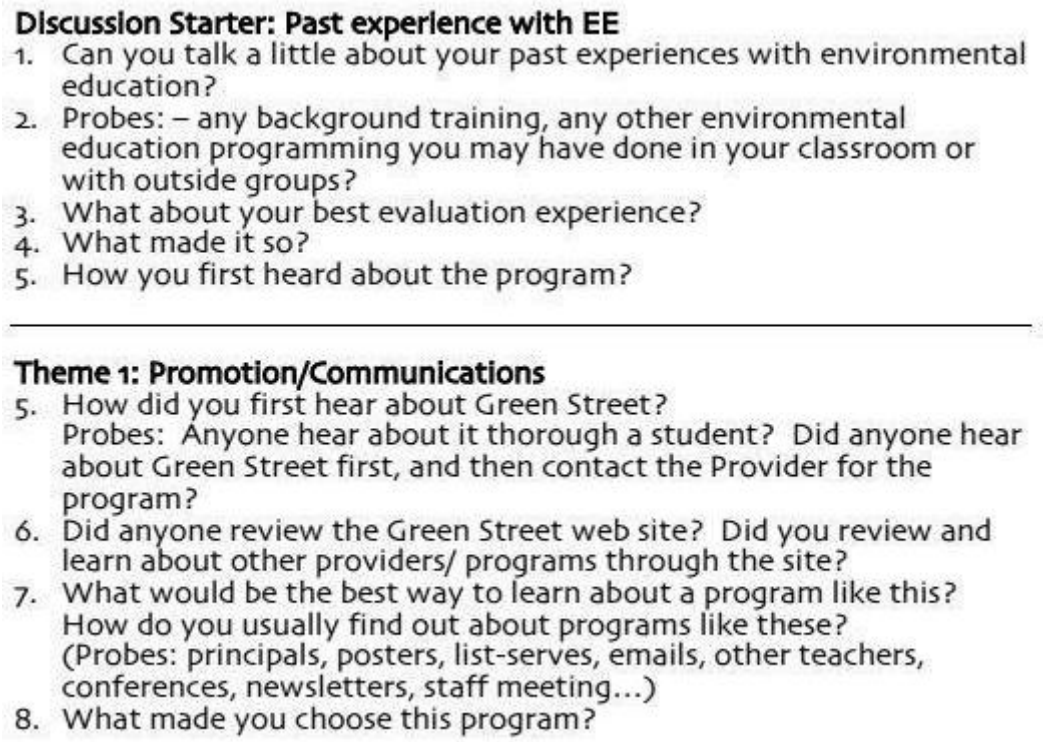
of these organizations sent surveys to students, they only received an 11 percent response rate (Smithsonian Institution, 2014). Overall, surveys can be used to measure the success of different educational programs and provide general feedback on participants' overall experience. This study also showed that using questionnaires as a means of evaluation is an effective method that garners a high response rate with teachers, but a low response rate with students. This verifies the use of surveys to evaluate teachers, but indicates that a more effective method is needed to evaluate student insight.

The evaluation study done at the Colombia Zoo in Cali, Colombia demonstrated that when surveys are conducted before and after an educational program, they can provide useful data and comparisons about students' learning pre- and post-visit. The students were evaluated through aptitude surveys that were given before and after the different educational programs to acquire comparable data for each student (White & Jacobson, n.d.). These surveys established a base-line comparison with the students' knowledge before and after their visit (White & Jacobson, n.d.). From this evaluation model, we noticed that pre- and post-visit surveys can be used for comparative analysis, which can then be applied to teachers and their understanding of Zoo educational programs.

Additionally, timing of when a survey is sent out has a large impact on the data, as it affects the number of responses received. In 2014, the Melbourne Zoo orangutan conservation campaign was evaluated, using surveys at different time points to measure its conservation impact on visitors who came to the orangutan exhibit. This evaluation method used four different time points for data collection: six months before and after the campaign, as well as six and twelve months into the campaign (Pearson, Lowry, Dorrian, & Litchfield, 2014). All of these survey collections provided the Zoo with comparative data to understand how much their visitors

knew before and after their visit. Overall, timing greatly affected how much the participant retained from the educational programs, as well as how many responses were received in a timely manner (Pearson, Lowry, Dorrian, & Litchfield, 2014).

Finally, a Canadian company, Green Street, evaluates the environmental education programs of other organizations as a basis for development. This company uses a set of schoolteacher survey questions to evaluate the impact and effectiveness of the programs under investigation. They use mostly open-ended survey questions, which develop a more meaningful and descriptive set of responses. The information provided by Green Street allows organizations to determine teachers' pre-existing ideas of their programs, leading to higher student satisfaction (Thomson & Hoffman, n.d., and Appleton-Knapp & Krentler, 2006). A sample set of interview questions from Green Street can be seen in *Figure 2*.



Discussion Starter: Past experience with EE

1. Can you talk a little about your past experiences with environmental education?
2. Probes: – any background training, any other environmental education programming you may have done in your classroom or with outside groups?
3. What about your best evaluation experience?
4. What made it so?
5. How you first heard about the program?

Theme 1: Promotion/Communications

5. How did you first hear about Green Street?
   Probes: Anyone hear about it thorough a student? Did anyone hear about Green Street first, and then contact the Provider for the program?
6. Did anyone review the Green Street web site? Did you review and learn about other providers/ programs through the site?
7. What would be the best way to learn about a program like this? How do you usually find out about programs like these? (Probes: principals, posters, list-serves, emails, other teachers, conferences, newsletters, staff meeting…)
8. What made you choose this program?

Figure 2: Green Street Open-Ended Questions

2.3.3 Student

Student Drawings

Student drawings, which are a form of surveying for children, assist organizations in evaluating the impact that their educational programs have on students. A study was performed at the London Zoo through the use of student surveys to evaluate the impact of its educational program. The desired outcome was to see if the conservation education program had a lasting impact on the participating students, ranging in age from seven to fifteen. The surveys were given pre- and post-visit to measure students' knowledge on conservation and how much information they retained, focusing on what they learned during their Zoo visit (Jensen, 2014 and Kelly, 2010). The Zoo's surveys were highly successful due to the drawing section for the younger students. The pre- and post-surveys asked for the students to draw their favorite animals in their living environment(s). The students' post-visit drawings were compared to their initial drawings to see if they retained what they learned at the Zoo and incorporated that knowledge into their new drawings. This demonstrated to the evaluators the impact that the Zoo's program had on the student visitors, as the students were able to clearly convey their thoughts through the drawings.

Student Photographs

An often less considered method of evaluation comes in the form of photography. Observing people by means of photographic evidence allows the researcher to look back at a situation and get a good idea of the level of participant engagement (Educators Belongings, Being & Belonging, 2010). For example, a group of teachers in an Australian kindergarten noticed that group time was not working for their students. Some students were very involved, but others were distant and said they disliked group time. As a means of evaluating the situation,

the teachers photographed their students to see how engaged they were, and then proceeded to determine why there were issues based on the facial expressions and body language of the children (Educators Belongings, Being & Belonging, 2010). This allowed the teachers to get a visual of the problem at hand, allowing them to adjust the program accordingly. In the context of zoos, if the Zoo staff notices that the visitors are not engaged, they will know to make similar adjustments.

Student Tracking

Tracking is typically a method that can be used to obtain data about visitor behavior and engagement throughout a visit. A study was completed by the Australian Museum to draw visitor paths, note how long visitors stopped, how much time was spent at certain activities, and their conversations and behaviors. This information established a strong grasp on visitor behavior, experiences, and learning. When this type of data was analyzed, it presented the underlying weaknesses within a program, thus depicting areas for improvement (Kelly & Bartlett, 2002). This case shows how student tracking can be used at the Zoo to evaluate schoolteachers and students when they are roaming the Zoo on their own after an educational session. This method is beneficial because it is helpful to know if the teachers have prepared their students for their visit to the Zoo in terms of educational content and organization.

2.4 Zoos Victoria

Until the recent formation of a new education model, called the New Model, the educational model and programs used at Zoos Victoria (ZV) had not changed for the past forty years. Previously, there were two educational models in action at ZV: a Zoo-Educator Led model and a Self-Guided model. The newest model is a combination of the original two models. The new model of education makes evaluating staff attitudes more important than before, because the

programs have gone from a more structured style of learning to a more open-ended education style. The changes made to the educational model have affected the way Zoo staff feel about the programs they teach (P. Lynch: Education Officer at Werribee Open Range Zoo, personal communication, 16 September 2015). For a more in-depth review of these educational models, please reference *Table 2*.

Model	**Education Style**	**Comments**
Educator-Led	-45 minute lecture with Zoo educator -Followed by schoolteacher/chaperone led tour of the Zoo	-Animal & Zoo educator interaction -Both Non-Formal and Informal
Self-Guided	-Teacher/chaperone led tour of the Zoo	-No animal or educator interaction -Informal Education
New Model	-Begins with lecture by Zoo educator -Teachers then given supplementary learning material for their self-guided tour of the Zoo -Group meets with Zoo educator throughout the Zoo to complete activities	-Structured -Animal & Zoo educator interaction -Non-Formal Education

Table 2: Zoos Victoria Educational Models, Adapted from Andrade, Bowe, Thomas, & Vannasse (2013)

Through ZV's educational programs, the Zoos seek to inform their visitors about the importance of wildlife conservation while still ensuring that they are enjoying their experience. ZV wants to better understand the impact that their Education for Conservation (EfC) initiative has on the visiting students and teachers, as well as the effect from Zoo educators participating in the visits. This can be measured through the use of different evaluation methods, which will be discussed in the methods chapter.

2.4.1 The Project

Zoos Victoria recently discovered through previous evaluation attempts that it is difficult to measure visitor experiences and the educational impact of their programs. Zoos Victoria educators have completed much research on how to evaluate educational programs, but are still putting forth a great effort towards finding the right method (P. Lynch: Education Officer at Werribee Open Range Zoo, personal communication, 16 September 2015). Zoos Victoria is continually developing their education programs, specifically the New Model, which is still in a trial phase. As a result, ZV has asked us to collect information to create a common evaluation tool for assessing whether their education and conservation goals are being met. This was completed by evaluating Zoo educator sustainability, schoolteacher satisfaction, and student engagement.

The next chapter explains the methods we used to accomplish this goal.

3.0 Methodology

The goal of our project was to provide a final set of tools that can be used for future evaluation at Zoos Victoria (ZV) and provided them with recommendations for future implementations. We worked predominantly with the Melbourne Zoo, but we also traveled to the Healesville Sanctuary and the Werribee Open Range Zoo. Visiting all three properties allowed us to gain a better understanding of the different educational programs in place at each location and determined how we could implement each of our methods. To reach this goal, we completed the following objectives:

1. Assess the effectiveness and feasibility of different methods for evaluating program sustainability from the staff's perspective
2. Assess the effectiveness and feasibility of different methods for evaluating the fulfillment of schoolteachers' expectations
3. Assess the effectiveness and feasibility of different methods for evaluating student engagement

The methods detailed below helped us achieve our goal of developing finalized evaluation tools.

3.1 Objective 1*: Assess the effectiveness and feasibility of different methods for evaluating sustainability from the staff's perspective*

We utilized and developed several social science methods to gain an understanding of the ZV staff's perspectives towards the Education for Conservation (EfC) programs, with a specific focus on evaluating how their attitudes are impacted by the program. The ZV staff is a critical component of the EfC program, therefore its satisfaction with daily teachings is imperative to the

overall success and educational value of the program (P. Lynch: Education Officer at Werribee Open Range Zoo, personal communication, 16 September 2015).

We used three different methods as a means for gathering information on the various aspects of the Zoo educator's day, and how they affected the outcome of their teaching and overall experience working at ZV. These aspects included specific differences in day to day occurrences, such as whether the students were late to their activities, engaged or disengaged in the activities, and additionally the weather (i.e. teaching in the sun versus the shade). Because the educators' schedules are incredibly busy, it was essential that our methods be quick and easy for the educators to complete. We utilized the ethnographic social science research methods of shadowing, interviews, and conducting focus groups with the ZV educator staff in order to gather data for this objective. Overall, we sought to find a correlation between the student learning, teacher engagement, and educator satisfaction.

Shadow Educator Staff

The first part of our project consisted of shadowing the ZV educator staff, which was completed in order to develop a better understanding of how ZV implements their conservation initiatives, the New Model of education, and their staff's attitudes towards the EfC programs. We specifically examined the staff's attitudes, which, as defined by our sponsors, included but were not limited to their overall happiness and satisfaction with the Zoo programs and how stressed they were at different points in their day. The purpose of assessing Zoo educator feelings was to better understand their opinions on how the educational programs are progressing and how sustainable the program is as a whole. We did this by observing the educators, asking questions periodically, and taking notes on their reactions to the various stimuli presented in the classroom during their different daily presentations, as well as through informal questioning upon

completion of a lesson. We shadowed educators to pinpoint recurring themes and trends that occurred during their daily educational sessions.

The informal questioning provided us with general responses on how the Zoo educators were feeling at different points throughout their day. Through simple observations during these questions, we were also able to determine situations that may have caused stress or happiness.

Interview Educator Staff

We conducted 30-minute semi-structured interviews with the Zoo educators either in person or over the phone in order to accommodate the ZV staff's busy schedules. We spoke with both fulltime and part time educators from all three of the ZV locations. We used semi-structured interviews because they gave us the freedom to adjust our questions to better suit the direction of conversation. During our interviews, we utilized the method of storytelling to learn more about the staff's attitudes on their daily education and the EfC initiative at ZV (J. Szkutak: retired Research & Development Director, Procter and Gamble Co., personal communication, 29 September 2015). For example, we asked educators to tell us about their best and worst experience at the Zoo (these questions and others can be seen in *Appendix A*), providing us with a deeper insight on their thoughts on the programs. These in person and phone interviews were scheduled to ensure educators set aside enough time to give meaningful responses. The informal questioning differed from the semi-structured interviews in that they helped us understand the Zoo educators' feelings about their work day, while the more structured interviews helped us learn their opinions and concerns specifically about the EfC program. For example, during informal questioning, one educator talked about how the hot weather made teaching classes harder, while during his interview, the educator discussed his concern with the bureaucracy of a not-for-profit organization of this size. With the help of the Learning Programs Coordinator,

Cyrelle Field, we worded the interview questions so that they were clear, concise, and non-confrontational. We ensured that the questions were formulated in this manner, as people may have been unwilling to answer our questions if they felt their job security was at risk or if their answers could negatively affect them. To further encourage maximum participation, the interviews were made voluntary and educators were ensured anonymity. Using the information gathered from interviews and shadowing, we were able to further develop the structure of our focus groups.

Focus Group with Educator Staff

Focus groups gave us the ability to determine whether all of the Zoo educators felt that they were meeting ZV's standards and goals. This method allowed us to determine if focus groups are a viable way to evaluate all of the educators' perspectives at once. Prior to the group meeting, we asked educators to complete a short self-reflection worksheet for critical self-evaluation (*Appendix B*). The self-reflection worksheet consisted of prompt-based questions as a means to get the educators thinking about their experiences over the past week. A group setting helped the educators collectively discuss common issues and share their ideas and concerns with both each other and management (Kelly, 2010). An example of the Educator Focus Group Agenda can be seen in *Appendix C.* Talking to all of the educators at once allowed us to quickly identify recurring themes that helped in developing our final evaluation tools and recommendations. Through this implementation, we also evaluated the feasibility of ZV using a focus group as a regular evaluation tool.

Using the three previously discussed methods in sequence allowed us to work from a more general standpoint towards a more condensed and concise means of evaluating the educators.

3.2 Objective 2: *Assess the effectiveness and feasibility of different methods for evaluating the fulfillment of schoolteachers' expectations*

Zoos Victoria wants to determine if the material being taught through their educational programs correlates with the teachers' curricula. If the material meets the teachers' expectations (curriculum correlation, for example) then they should be satisfied with the Zoo education programs (Hoey, Miralda, Tomkinson, and Tymon, 2012).

Schoolteacher Surveys

Another method we utilized to better understand schoolteachers' expectations was surveys. Zoos Victoria already had many pre-visit surveys to identify pre-visit information, but the questions largely regarded teacher demographics rather than desired outcomes of the Zoo visit. With the pre-existing ZV surveys, we were able to rework and add questions to determine if we could gather more detailed information. We used the questions supplied by Green Street, as discussed in the background, as a basis for development (Thomson & Hoffman, n.d.). Our surveys, which can be seen in *Appendix D* and *E* included questions that asked what teachers hoped their students would learn and their reasons for bringing their students to the Zoo. Altering the pre-visit survey provided a comparison between pre-visit expectations and post-visit outcomes. Asking these questions before the excursion, rather than after, ensured legitimate, unaltered responses.

Zoos Victoria is also implementing quality post-visit surveys. The point of our post-visit surveys was to determine if quality responses could be obtained. We altered the questions in the post-visit survey to be more explicit in gathering good comparison data. The surveys we created consisted mostly of rephrased questions from the original survey..

The interviews and surveys mentioned in this section were requested at different time periods, ranging from three days to two weeks before and after the Zoo visit, to see how timing would affect participation and schoolteacher interest. We also had the surveys sent out at three different times: 9:00 AM, 12:00 PM, and 2:30 PM. Additionally, the surveys were sent out over a range of time periods: three days before, one week before, and two weeks before the Zoo visit, as per request of our sponsor. This schedule allowed us to gather data about the optimal time to contact teachers regarding their visit, which could then be used to improve response rates on ZV's future surveys through the use of a predetermined schedule.

Schoolteacher Interviews

To gauge the other needs of schoolteachers, we conducted either semi-structured in-person interviews during the Zoo visit or phone interviews prior to the Zoo visit. We used semi-structured interviews because this style allowed us to adjust our questions depending on the direction of the conversation. Phone interviews were used to address the difficulty of meeting with teachers in person, as well as getting responses from teachers attending Healesville Sanctuary and Werribee Open Range Zoo.

The in-person schoolteacher interviews were reserved predominantly for teachers who did not fill out our pre-visit survey or speak with us on the phone, which is discussed in greater detail below. Conducting interviews in an informal setting let us obtain more in-depth information and adjust our interview questions to address individual teacher's concerns directly, which helped us gather relevant data. We used the data obtained from these interviews to learn about teachers' personal expectations and possible concerns with the new educational program style. The pre-visit interview questions can be seen in *Appendix F*. We implemented these

different types of interviewing to provide us a comparison of teacher participation levels for each method and to discover which type was the most successful.

3.3 Objective 3: *Assess the effectiveness and feasibility of different methods for evaluating student engagement*

By evaluating whether or not students were engaged during their visit at the Zoo, we assessed the most effective way for ZV to evaluate their educational programs. We completed this objective by testing three different evaluation methods: collecting student drawings, photographing students, and tracking the student groups. We used the data collected to determine which methods were the most effective for the creation of a simplified and final evaluation tool.

Collecting Student Drawings

We collected student drawings before and after participation in an educational program at the Zoo in order to begin understanding student learning. We requested the student drawings by linking the activity's instructions (which can be seen in *Appendix G)* in the pre-visit survey emails that we sent to schoolteachers. We asked the teachers to have their students draw and label a zoo scene to demonstrate their knowledge before attending the program. These drawings were completed, in fifteen minutes, by groups of about four students and numbered based on group and school, (i.e. St. Michael's Grammar school might have one picture labeled SMG 1). This resulted in us receiving only a few drawings from each visiting class, thus making it easier for us to review the drawings as they were submitted. The pre-visit drawings created a baseline for the class's knowledge and showed any gaps that were present in their understanding of the role of the Zoo, as shown by inaccurate labeling or minimalistic drawings. This method has been found to be most effective when implemented with students aged 7-12 years old, with ten-year-

olds exhibiting the largest positive increase in knowledge (Jenson, 2011). Over the course of the Zoo visit, students were exposed to wildlife in its natural habitat and the conservation practices related to different species. During their post-visit classroom discussion about their trip, schoolteachers were asked to have their students return to their initial groups and draw a new picture with the same theme as before. We helped teachers understand that they should not influence students in either the pre- or post-visit drawings. It was important that the students completed their pictures within their designated groups so the pre- and post-drawings could be easily compared, demonstrating what the students learned from their visit and how their knowledge was expanded. In order to assess and compare the pre- and post-visit drawings, we looked at increased details and whether the students incorporated ZV exhibits or initiatives into them. The increase in detail suggested that the students learned and retained information from their Zoo visit. This method has been proven to provide the user with important information about student learning and how the visit impacted student views on wildlife conservation (Jensen, 2014 and Thomson & Hoffman, n.d.) .

Strategic changes were made to this method in order to make it more efficient and effective for its implementation at Zoos Victoria. We ensured that there was labeling on the drawings to make the information easier to record, especially for quick comparison between pre- and post-visit drawings. We altered this method so that group drawings were submitted instead of individual drawings, as it made this method less time consuming because each visiting group submitted around one-fourth the number of drawings as there were students. Lastly, a standard rubric and data collection sheet, which can be seen in *Appendix H*, was used so that no matter who looked at the drawings, they arrived at similar outcomes and results. The drawings were assessed using factors such as accurate labeling, conservation expression, drawing elaboration,

and the inclusion of information from the Zoo field trip. This enabled us to evaluate what the students learned and if there were common and recognizable themes among all of the submissions (Jensen, 2014 and Thomson & Hoffman, n.d.).

This method focused on developing a way to evaluate student knowledge in order to make the programs more impactful and effective.

Photographing of Students

Another method that we used and developed at ZV involved photographing students. Photographs let evaluators interpret body language, allowing for a better understanding of the student engagement at various exhibits and activities (Educators Belongings, Being & Belonging, 2010). Multiple experts in the field have made it clear that while this is a time-consuming method, the time is well spent because a significant amount of information can be obtained (Diamond, 1999; Educators Belongings, Being, & Belonging, 2010). The most effective time to take photographs was at the informational sessions led by the Zoo educators. At these locations, the educators were with small groups of students in a confined space, making it relatively easy to set up a camera and run a time-lapse of photos, with photos being taken at ten second intervals. These photos allowed us to see how different groups interacted with the exhibits, and how much time was spent at certain activities. If the same presentation occurred more than once on the same day, we photographed all sessions, if possible, to see if time of day had any effect on student engagement.

While this method offered important information, parental and student permission, as well as full disclosure of any image usage, were utilized to protect the students' privacy. We sought permission from schoolteachers prior to their Zoo visit asking if it would be okay for us to photograph their students. After receiving verbal confirmation, we emailed them with further

details about the purpose of photographing and to provide our consent forms (*Appendix I)*. We developed a standard rubric to avoid the risk of the evaluator's personal interpretation. The standard rubric included cues to look for that express interest or learning, as well as signs that demonstrate a lack of student engagement, such as playing on a phone (*Appendix J*).

While photographing, we made observations about what we saw and heard. When analyzing the photographs, we noted the signals that expressed engagement and disengagement as well as any correlations between our observations and the cues in the photographs.

Tracking Field Trips

After the students and schoolteachers met with a Zoo educator at the educational sessions, they were left on their own to visit the rest of the Zoo. By tracking and observing these groups, we were able to see if the teachers and parent chaperones were teaching their students and what exhibits they went to visit. While solely focused on tracking, we did not interact with the students, teachers, or chaperones. This rubric contained a Zoo map to mark the group's paths; a place to note any scheduled presentations visited, such as an orangutan feeding; and a place to note dwell time, which is how long the group stayed at each exhibit.

3.4 Final Evaluation Tool Requirements

This project's goal was to provide ZV with a usable evaluation tool for their EfC programs. Through our testing, we developed methods that would be feasible to implement in the future and allow ZV to complete regular evaluation on their education programs in a time efficient manner. Upon completion of our project, ZV was given the tools they need to best evaluate their educator staff, schoolteacher expectations, and student engagement. Our final recommendations also gave our thoughts, based on our findings, about how ZV could better improve their overall EfC program.

4.0 Findings

In order to progress through the objectives we discussed in section 3.0, we began by shadowing the Zoo educators to gain a better understanding of the various educational programs. We then began implementing schoolteacher pre-visit surveys, where we gained more insight on teacher expectations. Next, we observed education sessions, where we were able to look at educators, teachers, and students simultaneously and determine if there was a correlation among all three groups. We used the information gathered from these three methods to progress into student tracking, educator and schoolteacher interviews, schoolteacher post-visit surveys, and finally Zoo educator focus groups. All of the information we gathered helped us create final evaluation tools for Zoo Victoria.

4.1 Shadowing and Observations

Through shadowing Zoo educators at different educational sessions, we planned to examine the staff's attitudes, which--as defined by Zoos Victoria (ZV)--included but were not limited to, their overall happiness and satisfaction with the Zoo programs and how stressed they were at different points in their day. During shadowing, we were able to ask the educators questions when they were finished teaching, which helped us formulate our potential questions for our Zoo educator interviews. This method is discussed in detail in section 3.1.

Over a three-week time span, we observed thirty educational sessions with Early Years (ages 4-8) and Middle Years (ages 9-16) students (early years and middle years are the age groups specified in the Australian school system). These observations allowed us to recognize a correlation among Zoo educators, schoolteachers, and students. Our method changed accordingly from observing only the educator to also observing the other key groups, resulting in a list of

common themes. We created a list of themes on what we remembered seeing most often, but as we went through our notes and found other themes that occurred more frequently, we added them to our list. This process allowed us to go from open ended notes to quantifiable data. While reviewing our notes from these observations, we looked at key words and counted how many times each theme occurred out of thirty total observation sessions. If a single theme occurred more than once in a session, it was only counted one time. *Table 3* shows each theme and the frequency with which it occurred.

Theme From Observations	Occurrences	Percentage
Teacher/chaperone on Phone	5	17%
Teacher/chaperone not involved	8	27%
Teacher/chaperone engaging students	18	60%
Educator being rushed	9	30%
Educator at ease when students are participating	14	47%
Educator engaging students who aren't participating	21	70%
Educator tailored talk to curriculum	22	73%
Students taking pictures	7	23%
Students fidgeting (playing with lanyards, backpacks, etc.)	10	33%
Students distracted by animals on display	10	33%
Students coming in late	10	33%
Students having phones out	11	37%
Students have to be pushed to answer questions	11	37%
Students going toward interactive exhibits	13	43%
Students socializing instead of participating in lesson	16	53%
Students excited to answer questions	21	70%

Table 3: Common Themes from Observations

We noticed some themes that occurred commonly in positive sessions. During an educational session with the Early Years, one schoolteacher was very engaged with both the

students and the Zoo educator. The teacher sat on the floor with the students and participated in all of the activities. We observed that in 60% of educational sessions, schoolteachers played a significant role in how engaged students were by asking questions, encouraging participation by students, or even participating in the lesson themselves. The educators tailored the talk to the teacher's curriculum in 73% of the educational sessions we observed. For example, in one session the educator incorporated Indonesian animals into the talk per the request of the teacher, while still conveying ZV's conservation messages. Additionally, in 70% of the sessions we saw, students were excited to answer questions. Very often, student and schoolteacher enthusiasm correlated with the educator's personalized adjustment to the individual education session. This demonstrates that students were eager to answer questions since they had already been exposed to the material prior to their visit. We found that these themes are strongly linked to each other and contributed to a positive education session. We found that there are very few positive indicators or themes for student engagement. Student engagement can be better measured by noting a lack of negative indicators.

We also noticed some themes that commonly occurred in negative sessions. During an educational session for Early Years students, an educator was visibly frustrated with how unruly the kids were. The schoolteachers and chaperones were unengaged with the activities, and some were even using their cell phones, which occurred in 17% of the sessions we observed. The educator was forced to act as a supervisor and was unable to fully devote his or her effort to engaging and teaching the students. As a result, roughly one half of the students were completely unengaged, running around and ignoring the activities. Many of the common themes in the table represent when students are unengaged, but we used specific themes so that issues could be more clearly addressed. As the data shows, without the help of the teacher, it is difficult for the Zoo

educator to have a good class where the students learn the take away messages. This combination of observations represents a correlation among Zoo educators, schoolteachers, and students. A more detailed way of organizing this correlation compared to *Table 3* can be seen in *Appendix K*.

Observation of educational sessions is an effective way to evaluate the Education for Conservation (EfC) programs by simultaneous examination of Zoo educators, teachers, and students. These observations resulted in the formation of a standardized evaluation form (*Appendix L)*. We took the common themes from our observations and separated them into categories based on students, teachers, and educators. The categories each contained several things evaluators observe, for a total of twenty-one items. Initially, there were only sixteen items, but upon review of the sheet, we realized there were other things evaluators should look for, such as "Did the educator arrive to the session early enough to set up the educational session?" We were able to test the observation sheet throughout its development and made changes as we gathered more information, but the evolving nature of the sheet meant we were unable to trial the final product. By testing our standardized forms, we determined that it was much more time efficient to check boxes for our list of common occurrences, rather than write notes on everything we observed. The simplification of all of our observations allowed us to streamline this method to make it less time consuming for future evaluators.

The information we gathered through shadowing enabled us to further develop the interview questions for Zoo educators and schoolteachers. For example, we used the common themes we recognized to formulate our questions, such as asking how student behavior affected educator satisfaction.

4.2 Zoo Educator Interviews

We conducted twelve 30-minute semi-structured interviews with the Zoo educators either in person or over the phone in order to accommodate the ZV staff's busy schedules. We spoke with both full-time and part-time educators from all three of the ZV locations. Semi-structured interviews were used because they gave us the freedom to adjust our questions to better suit the direction of conversation. More details regarding this method are in section 3.1.

There were common themes that were present in many of the Zoo educator interviews. Before conducting the interviews, we created a list of themes that we thought would arise during the interviews. After completing the interviews, we went through our notes and counted how many times these themes occurred. If there were topics that arose often that we did not initially expect, we added them to the list. The most common themes can be seen in *Table 4*.

Theme from Interviews	Occurrences	Percentage
Teacher Affects Lesson	10	83%
Not Enough Educational Time	7	58%
Rushed through Day/Busy	6	50%
Developing a Connection with Students	6	50%
Technology Struggles	5	42%
Underdeveloped EfC	5	42%
Teachers Not Reading Prep Information	5	42%
Middle Years "Too Cool for School"	5	42%
Develop Skills	4	33%
Repetitive	3	25%
Dealing with Politics/Bureaucracy	3	25%

Table 4: Common Theme from Zoo Educator Interviews

As we discovered through shadowing the Zoo educational sessions, schoolteachers' behaviors have an effect on the overall impact and learning outcomes of a lesson. Interviewing the Zoo educators helped confirm this hypothesis, as the data in *Table 4* shows that ten out of

twelve educators felt the teacher affects the lesson in some form. Sample quotes that support this point are: “Teachers who are not engaged make it difficult to get students engaged” and “Discomfort from teaching a class normally comes from having a negative interaction with a teacher… A disengaged teacher makes you really uncomfortable… If you want the students to engage, you [the teacher] need to engage as well.” The data collected through interviews helped confirm the relationship among Zoo educators, schoolteachers, and students that we previously observed during shadowing.

Throughout the interviews, Zoo educators expressed concern about being rushed at many different times throughout their day. Seven of the twelve educators said that twenty minutes in the Hive (educational session) was not enough to share all of the information they wanted to give. The educators were not prompted about this topic. Additionally, other educators said they felt rushed during the day, but did not specifically mention the twenty minute time frame. One Zoo educator stated, “We are getting such short times with the kids, and the impact [on the students] is very hard to measure.” The lack of time with students also prevents the educators from building a rapport with students, which is something that many educators miss about their previous job as schoolteachers. One Zoo educator said, “I try to remember names as much as possible here...I miss that element [of knowing students’ names]. I try to develop a strong enough relationship to impart messages.” In reference to the Hive sessions, two educators jokingly said that we should “put [this issue] in bold and all caps!” suggesting how strongly the Zoo educators feel about the issue of time.

Based on our findings, we concluded that interviews are an effective method of learning about Zoo educator concerns and opinions about the educational programs they are teaching and their jobs in general, but they are overly time-consuming. The interviews typically ran for the

allotted 30 minutes, though a few went far beyond that limit. Due to the number of educators at Zoos Victoria, interviewing each one was not time efficient. Regardless of the time commitment required, educator interviews helped us gather data that aided the development of our next educator method: focus groups. The common themes that arose from the Zoo educator interviews were used to determine what topics should be discussed and addressed in focus groups.

4.3 Zoo Educator Focus Groups

The focus groups were designed to encourage a discussion about whether the Zoo educators felt that they were meeting ZV's standards and goals. A pre-focus group self-reflection worksheet that consisted of prompt-based questions was used to get the educators thinking about their experiences over the past week. These self-reflection sheets were also discussed during the focus group. More details regarding the setup and implementation can be found in section 3.1.

During the focus group, one educator discussed that he/she needed help staying on time in the Hives. A second educator went on to say he/she could offer "some advice about things that worked for me in the Hives and how I stayed on time, and the key things I try to get out in the time." At the completion of the focus group, another educator said, "I feel like we've purged," recognizing the benefit that focus groups can have for the team. Additionally, educators said this is something they would be willing to do once per term, but noted that since there would be more educators present (our focus groups only had four educators present and ran for one hour), they would need more time to complete the exercise in the future. Not only do focus groups allow for open conversation, but they also provide a supportive and safe environment for Zoo educators to feel comfortable voicing their opinions and feelings. In reference to their supervisor being present at the focus group, some educators said, "I'd feel safe. We're pretty honest in this team." "Everyone's quite transparent. You back each other up. You're not working in isolation." "It

makes a big difference if your superior has done the same job as you… They have a good insight of what you're doing."

Focus groups were useful in helping the ZV educator staff discuss problems that may be occurring during their workdays. This method is significantly less time consuming than interviews, but it still achieves the same desired outcome of gathering Zoo educator opinions and concerns. Additionally, the educators were able to hear each other's concerns and were able to offer help to one another, which differs from the individual interview setup. These findings helped shape the final format of a focus group for the Zoo educators, which can be implemented in the future at Zoos Victoria.

4.4 Pre-Visit Schoolteacher Surveys

Pre-visit schoolteacher surveys (using Google Forms) were sent via email in order to better understand teachers' expectations and desired learning outcomes of their Zoo visit. We sent surveys over three different time periods: Three Day Response Period, One Week Response Period, and a Two Week Response Period and at three different times: 9:00 AM, 12:00 PM and 2:30 PM to see how timing would affect participation and teacher interest. These times were chosen to determine the optimal time to send surveys in order to maximize response rates. More information on this method can be found in section 3.2.

We used a pre-determined schedule to send 200 surveys, and we received 63 responses. When we were recording who had completed the survey, we realized that there were multiple responses coming from certain schools. Initially, we only sent the survey to one teacher from each school, so this proved that the survey was being forwarded on to other participating teachers from these specific schools. Of the 63 survey respondents, 12 were not the original recipient of the email, confirming that they were forwarded the survey. Therefore, we do not know exactly

how many teachers received the survey. Normally, forwarding of emails is significant for ZV, because if the schoolteachers who booked the Zoo trips do not forward the emails they receive, then the other visiting teachers will not have the information they need to thoroughly prepare for the visit.

Our return rate of 32% was significantly higher than previous surveys that ZV sent, which only had about a 1% response rate (Zoos Victoria, 2015). This dramatic difference in response rates was likely due to a number of factors: the "pleading" tone of the email (*Appendix M)*, the mention of student researchers, and the personalization of the emails. We also found that allowing teachers one week to respond to the survey was most effective at maximizing the response rate. Of teachers who responded to surveys sent three days, one week, and two weeks prior to the school's visit, the percentage of respondents from each group was 24%, 51%, and 25%, respectively. We believe that the two week response period gave teachers a lot of time to complete the survey, but did not invoke a sense of urgency. The three day period got a lot of responses quickly, but many teachers answered on the day of or day after their Zoo visit, indicating teachers either did not have enough time or completed the survey with a bias. As seen in *Figure 3*, giving schoolteachers one week to reply provided the desired balance between urgency of completion and time for completion needed to maximize responses.

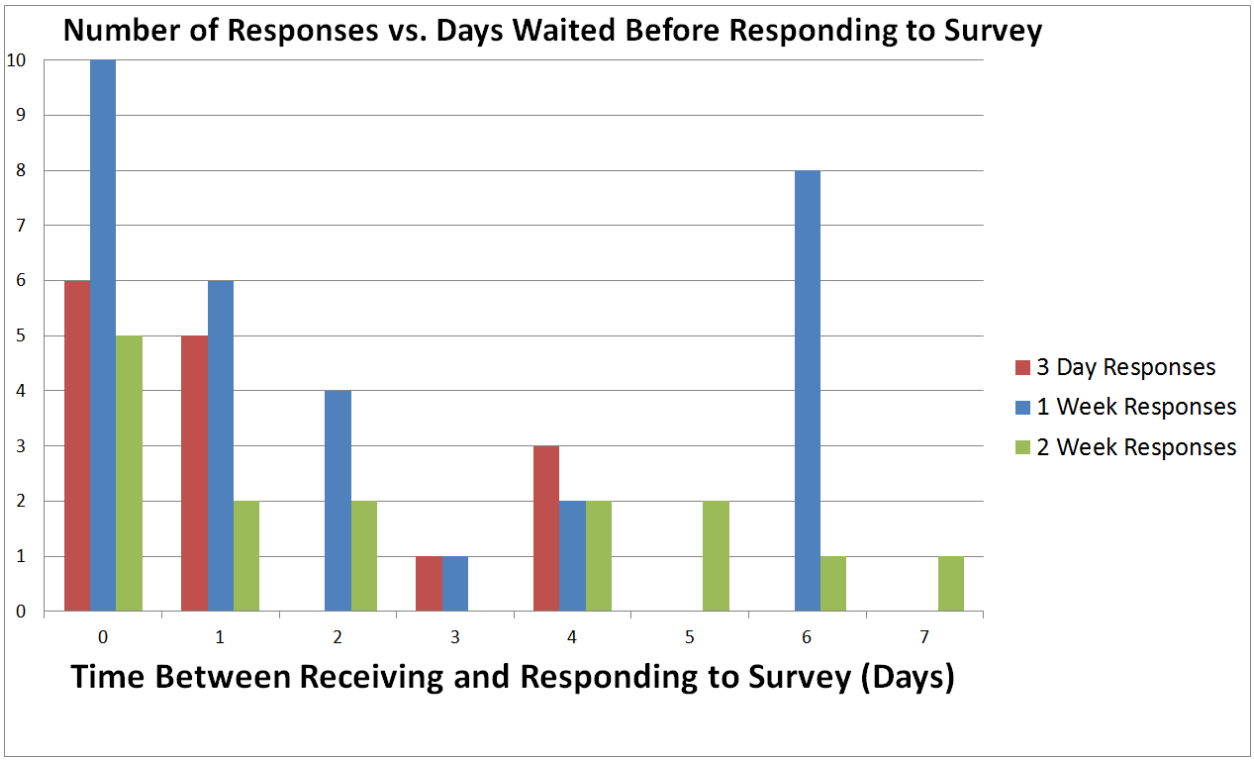


Figure 3: Graph of Survey Responses Based on Days Waited Before Responding

Also, 40% of all respondents completed our survey between 1:00 PM and 3:00 PM. As seen in *Figure 4*, the time range correlates with the least busy time of the day for schoolteachers: during lunch, and at the end of the day when their students leave.

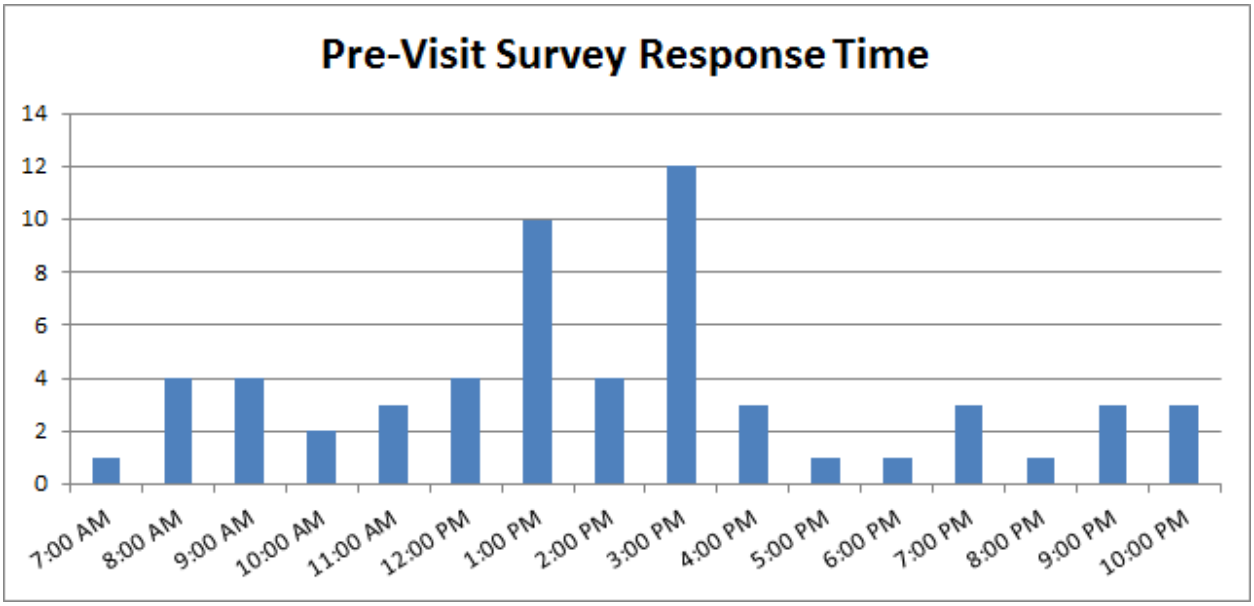


Figure 4: Graph of Survey Responses Based on Time Completed

Sending the surveys to schoolteachers at 12:00 PM encompasses the 1:00 PM - 3:00 PM time range when most teachers responded. This timeframe was much more effective at gathering responses than sending the surveys at other times. When the surveys were sent at 9:00AM, 12:00PM, and 2:30PM, there were response rates of 22%, 48%, and 30% respectively. This can be seen in *Figure 5*. These numbers correspond with the times at which we received the most survey responses (1:00 PM and 3:00 PM).

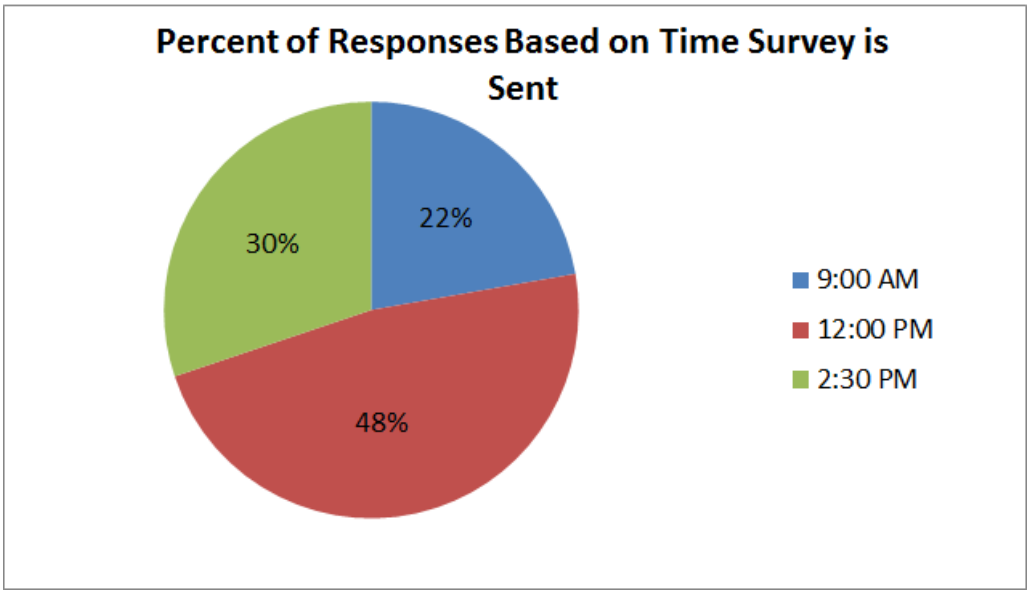


Figure 5: Chart of Survey Responses Based on Time Sent

After analyzing the timing, we focused on which key ideas could impact school visits. For example, 44% of responding schoolteachers had never attended a Zoo visit before. This could affect the teachers' expectations of their day at the Zoo and how they are preparing for their visit. We asked many questions about teachers' expectations and what topics they hoped their students would learn about. For example, schoolteachers were asked how often they discussed wildlife conservation with their students and the answers greatly varied, as seen in *Figure 6*.

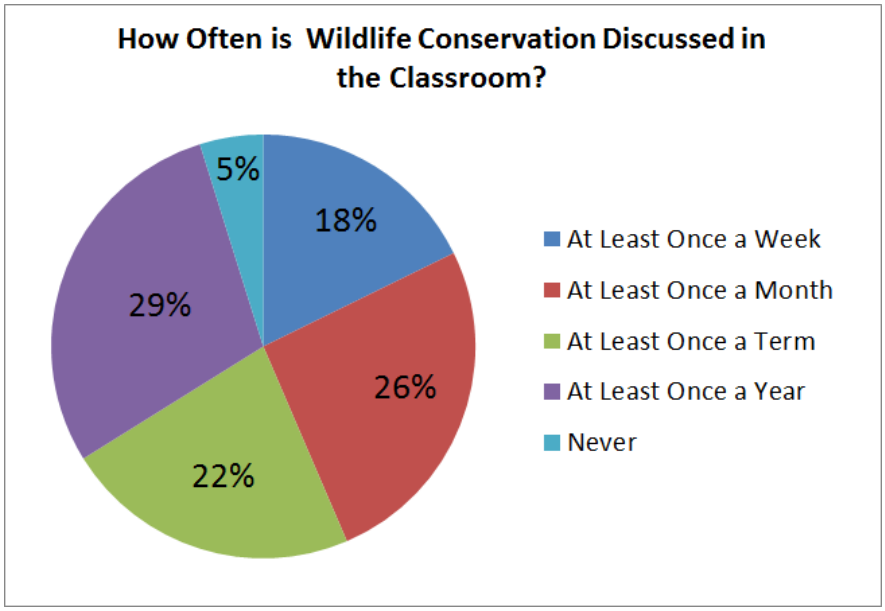


Figure 6: Chart of How Often Wildlife Conservation Discussed by Schoolteachers with Students

This range of responses demonstrates that wildlife conservation is not always being discussed regularly in the classroom. This irregularity in discussion suggests that different groups of students have varying levels of knowledge on this topic, but the Zoo visit still provides more information on wildlife conservation to students, regardless of previous knowledge. The gathered data from the pre-visit surveys can be used to help ZV adjust their programs to accommodate for things such as the age group of each visiting class, the amount of support teachers have for supervision of students, etc. The information from the pre-visit surveys can also be used to identify teacher expectations. Most of the responses convey specific schoolteacher expectations, with 73% discussing that a correlation to their curriculum is their main focus, in addition to the traditional Zoo experience. This shows ZV what the schools are hoping to obtain by visiting the Zoo.

Pre-visit Surveys are an effective tool to gather information if sent at the appropriate time and forwarding information is collected. We recommend that ZV continue to use, pre-visit surveys as an ongoing evaluation tool. The pre-visit survey findings also set the basis for our

analysis of the post-visit surveys and provided us with clear data to determine the best time at which the post-visit surveys should be sent.

4.5 Post-Visit Schoolteacher Surveys

The post-visit surveys were only sent to schoolteachers who filled out the pre-visit survey for a total of 63 surveys sent. As described in section 3.2, we sent our post-visit surveys at 12:00 PM. We intended to send the surveys either three days, one week, or two weeks after the schoolteachers' Zoo visits, but due to a miscommunication between us and our sponsor, many surveys were not sent on the scheduled dates. Our lack of clarity in communicating the schedule led to the majority of surveys being sent in one day, meaning most surveys were sent at random time intervals, not related to our initial three day, one week, and two week schedule. Therefore, we cannot determine what time frame is best to send post-visit surveys to schoolteachers. Regardless of the initial confusion, our post-visit survey had a response rate of 32%. The post-visit surveys were completed at times similar to the pre-visit survey, with 12:00 PM and 3:00 PM giving us the most responses, as seen in *Figure 7*.

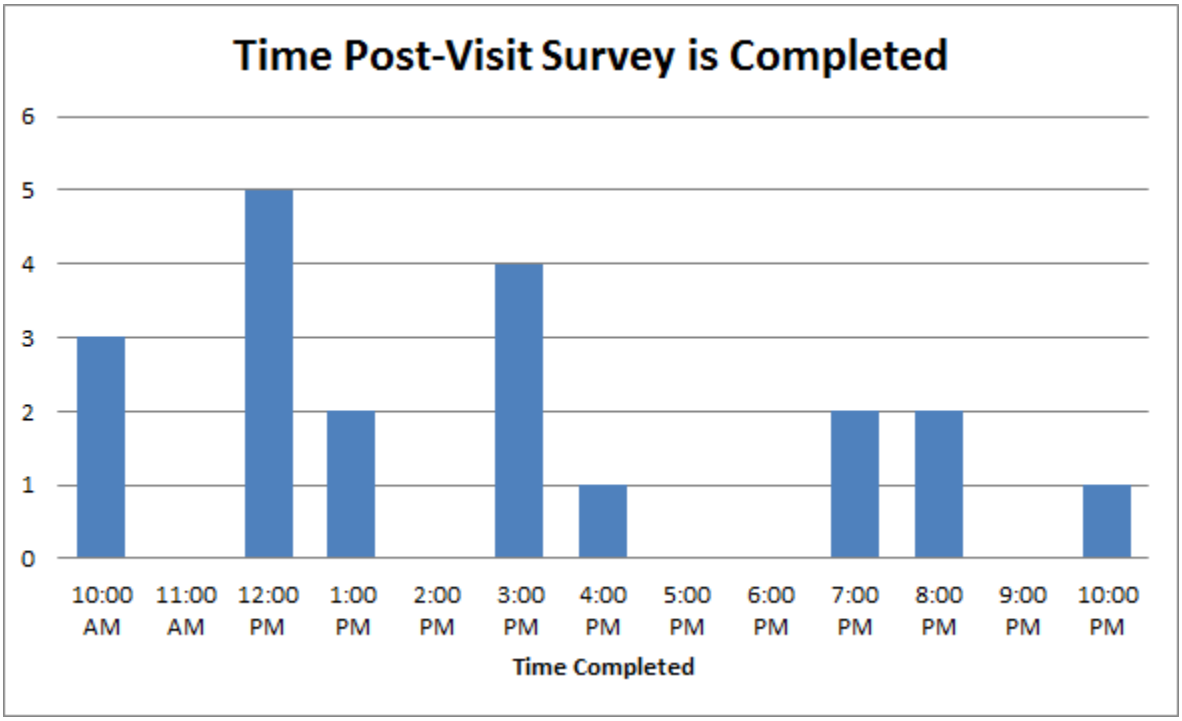


Figure 7: Graph of Time Post-Visit Survey is Completed

The information collected from these surveys will help ZV establish a comparison between pre-visit expectations and post-visit outcomes. The schoolteachers were asked to rate how well their expectations were met, and we calculated an average rating of 4.3 out of 5.0. The teachers were also asked to rate how relevant the visit was to their classroom learning, which received an average rating of 4.5 out of 5.0. Typically when these types of ratings are requested, the average is 4.8 out of 5.0, as stated by the ZV Learning Experiences Coordinator, so the lower scores may come as a surprise to Zoos Victoria. In addition to a rating of the Zoo experience, teachers were able to provide feedback and other information about their visit. The feedback often consisted of recommendations for ZV and any issues they had with the program they attended. Details gathered from feedback will be helpful to ZV in determining if any changes need to be made to areas of the Zoo visit process. teachers were also asked if they planned to participate in any of ZV's conservation initiatives, such as the program Wipe for Wildlife, with

their class. The answers to the survey questions give ZV an indication of the impact the Zoo visit has on visiting classes. Overall, the information gathered from both the pre and post-visit surveys will allow ZV to understand teacher expectations and satisfaction levels. In summary, a combination of pre- and post-visit surveys is effective at identifying schoolteacher expectations and evaluating whether the expectations have been met.

4.6 Schoolteacher Interviews

Schoolteacher interviews were implemented over the phone, as well as in-person at Zoos Victoria. Teachers were asked a set of questions about how they prepared for their Zoo visit and what they had planned on having their students do throughout the day. More detailed information on this method can be found in section 3.2.

During our phone interviews, we called a total of 22 schoolteachers. Of these teachers, eight answered on the first call, and five agreed to answer our interview questions. Of the five people we talked with, four said they would be okay with us photographing their students. We left messages for those we were unable to reach, and of these people, two called back. Additionally, most of the teachers we spoke to answered with short, blunt answers, making it clear that they did not want to spend their time talking with us. One teacher even said she was on her lunch break and could not be bothered to talk with us. While the response rate for schoolteacher phone interviews was 23%, the amount of work needed to gather responses makes this method inefficient. As the important information gathered from the interviews can be obtained in our surveys, we do not recommend phone interviews.

We conducted our in-person interviews with schoolteachers during and after Zoo education sessions. Generally these interviews took five minutes to complete, but some teachers spoke to us for much longer. This method worked most effectively when we were introduced to

the teachers by the Zoo educators, explaining that we wanted to conduct an interview for research purposes. Some teachers spoke to us in much greater detail, while others hesitated to leave their school groups to speak with us. Additionally, a few of the schoolteachers that we spoke with were not the group leaders, and lacked answers to all of our questions.

In one interview, we were unable to finish asking all our questions because the schoolteacher was too busy disciplining his students. We spent 25 minutes talking to this teacher, and only recorded responses for half of our questions. In another instance, we spent 45 minutes talking to one teacher, in which the conversation diverged and it was difficult to get back on topic. Furthermore, another teacher was visibly stressed when asked to answer questions. He said that he needed to watch his students and that the interview would need to be very quick because he had other concerns. Though the information gathered from teacher interviews was beneficial to our method development, we found that they are very time consuming, and teachers were often too busy to participate.

During the in-person schoolteacher interviews, we determined that 86% of participants had received the pre-visit information packet but had not read through the information or discussed the material with their students. The pre-visit information packet contains documents about how teachers can best prepare for their visit and what they should review with their students. This clearly shows that there is a lack of effective communication between the Zoo educator staff and teachers, which can lead to teacher dissatisfaction. When the teachers are not fully prepared, they can become unhappy with ZV's educational program and cause added stress for the educators. One educator said, "When they [schoolteachers] aren't involved, it shows that they did not prepare or do anything prior to the visit. Sometimes teachers do not read the full pre-visit email package and expect more educational programs and do not expect to be as involved as

they should be." Based on these interviews and previous research from our Zoo educator interviews, we found that teachers are not reading the provided material, possibly due to issues regarding how the material is being presented or distributed. Even though most teachers are receiving pre-visit information, they are not necessarily reading the packet of information and therefore are not prepared for their visit. On the other hand, some teachers are not being forwarded the information from their supervisors and, as a result, cannot be fully prepared.

By gathering and analyzing all of the schoolteacher interview responses, we determined that although the interviews were beneficial to our research, the same information can be obtained more quickly and efficiently for ZV in the future through the addition of our interview questions to the pre-visit survey.

4.7 Student Tracking

We initially began student tracking by utilizing museum-style tracking (following groups around ZV in order to see which exhibits they are going to, for how long, their discussions, etc.). More detailed information on this topic can be found in section 3.3. While attempting to track student groups after they left educational sessions, we found that most Middle Years students broke up into small groups of about four students. These small groups were left to wander the Zoo, often without supervision. Following a group of four students, when the class contains more than 50 students, does not provide a good representation of the entire group. It was also extremely difficult to follow multiple student groups around from exhibit to exhibit, especially when they were without a teacher, because of the large size of the Zoo. Since the students were on their own, it was impossible to measure what information the teacher had shared with their students. As a result, we decided that museum-style tracking was not a beneficial method for evaluating where and how the students and schoolteachers spent their day at the Zoo after their

educational session. We then moved to observing the different keeper talks to see if the visiting student groups were attending these sessions. This decision led us to the development of keeper talk observation sheets, which can be seen in *Appendix N*.

We found that sitting at keeper talks and other important exhibits around the Zoo shows if the students are going to the educational sessions offered for the program in which they are participating. While attending these visits, we took notes on our observations and standardized the observation sheet, summarizing the general findings. We sat in on ten keeper talks and found that it was difficult to determine which students go to which school, something we had initially intended on noting for the sheet. Instances such as this led us to make continuous changes to our observational sheets. As a result, we did not get time to fully test the keeper talk observational sheets, but we noticed that this type of tracking can gain insight on student engagement levels and if they are attending the recommended sessions.

4.8 Student Drawings

We collected student drawings before and after participation in an educational program at the Zoo to see if an increase in student knowledge could be identified. Teachers were sent instructions for this activity as part of our pre-visit survey. We collected the drawings from participating classes at the beginning of their Zoo visit, and afterwards we emailed the schoolteachers requesting that they send the post-visit drawings to us. A more detailed explanation of this method can be seen in section 3.3. Initially, 16 schoolteachers out of 52 (we began to ask teachers if they wanted to participate in the activity after we already had 11 responses) showed interest in a pre-visit classroom activity, but eight later declined once they saw the activity (see *Figure 8*). Only 8 out of 16 of our pre-visit survey participants said that they would complete the pre-visit drawings and only two people handed them in. Although we

requested that those schoolteachers send back post-visit drawings, we did not receive any submissions. This prevented us from comparing the pre and post-visit drawings, thus making this method of evaluation ineffective. The lack of interest could have been related to a variety of things: time required for the activity, age group of students, etc., however, we were unable to gather enough data to draw any conclusions.

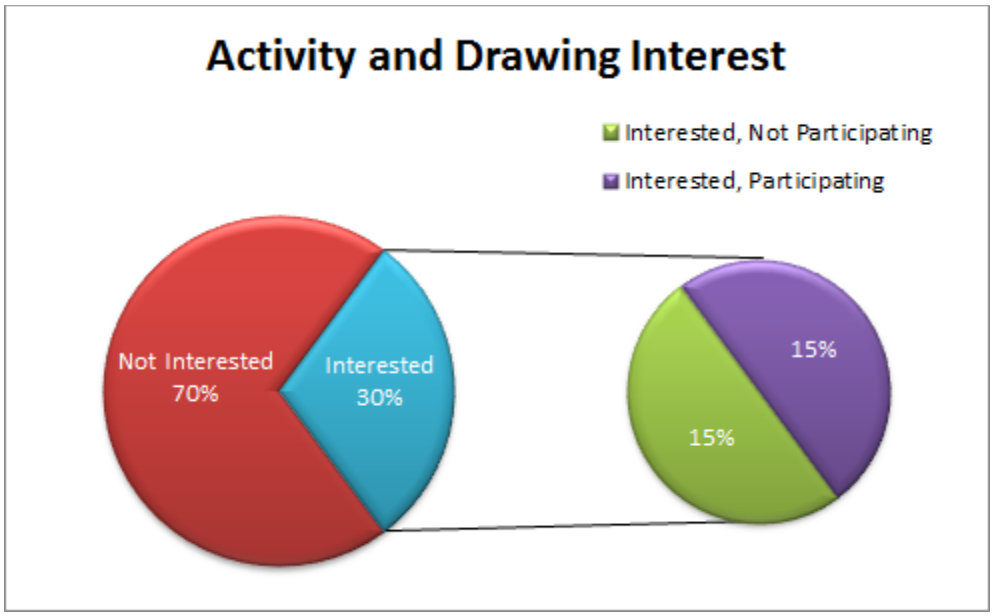


Figure 8: Chart of Student Drawings Activity Interest

Drawings and other pre-visit activities may prove beneficial to helping students prepare for their visit to the Zoo. The drawings that were submitted to us were very similar to those found in previous research on this method. A comparison of the drawings can be seen in *Figure 9*. Some of the drawings we received were very detailed and well-labeled while others were minimalistic, but all of them were similar to those in the research we completed. Drawings can be used to solely measure students' pre-visit knowledge since post-visit drawings are difficult to obtain for comparison to see if there was an increase in student knowledge. The similarities between the drawings we received and those found in the literature on this method suggest that if

schoolteacher interest was higher, this method could be effective in gauging how much students learned from their visit.

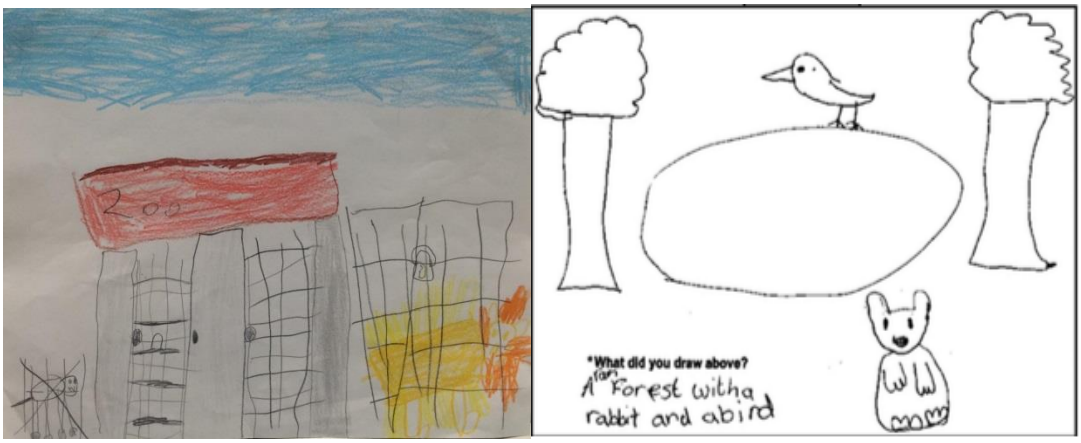


Figure 9: Comparison of Student Drawings Collected at Melbourne Zoo (Left) and Drawings Collected at London Zoo (Jensen 2012) (Right)

Student drawings have the potential to be a worthwhile tool; however, the current outcome is unworthy of the effort and time necessary to successfully implement this activity. As a result of this finding, we completed additional research on other potential pre-visit activities that could help prepare students for their Zoo visit. Further description of these activities can be seen in section 5.3 of Conclusions and Recommendations.

4.9 Student Photographs

Photographs were used to capture student engagement during Zoo educational sessions, where time-lapse photographs were taken every ten seconds, in addition to a full-length video. An in-depth explanation of this method can be seen in section 3.3. In the Gorilla Hive, the camera was set up on top of the air conditioning unit, facing the back wall near the door. In the classroom near the garden, the camera was placed on the back window sill facing the door. We initially planned to develop and test a standardized rubric to evaluate the pictures and see

whether the students were engaged or disengaged. After analyzing the photographs, we discovered that using our rubric to analyze the photographs was not feasible.

Not only was the process of analyzing the photos difficult, but gaining permission to take the photographs was difficult as well. Of the 22 schoolteachers we contacted for phone interviews and photograph permission, only four said it was okay for us to photograph their classes. Many teachers were unsure if they could give permission without talking to their supervisors and others were only in charge of booking and were not attending. The struggles presented by this method exemplified the difficulties associated with gaining permission over the phone. As a result, photographing students for the purpose of measuring engagement levels is not effective.

4.10 Summary

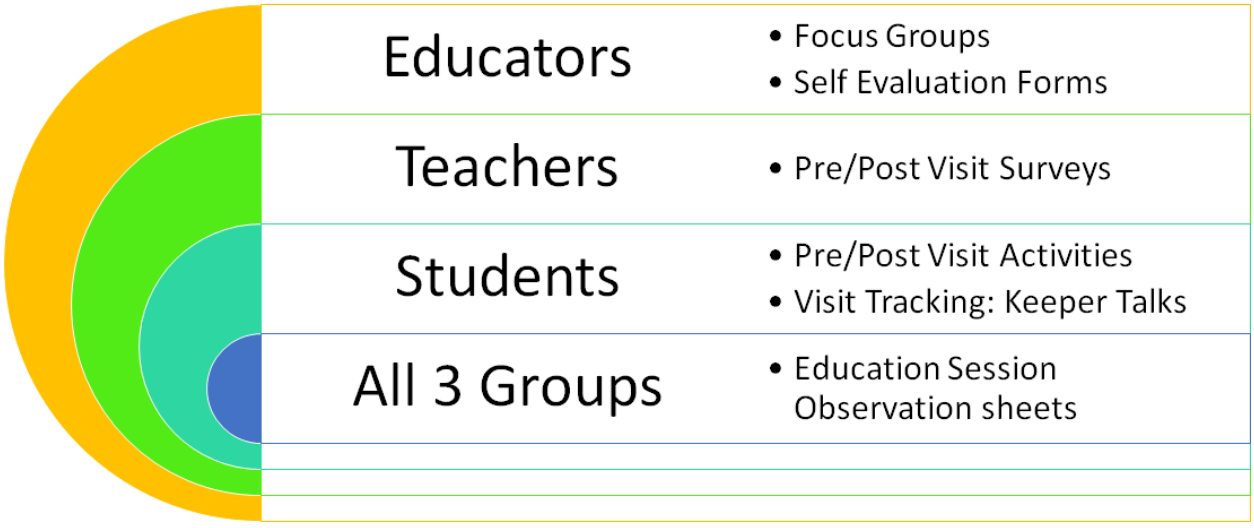


Figure 10: Summary of Evaluation Tools

Upon completion of our research, we used our data and findings to develop a set of refined tools ZV can use for future program evaluation. In order to evaluate the Education for Conservation programs from the Zoo educators' perspectives, we recommend a focus group

agenda to be used in tandem with self-evaluation forms. We developed pre and post-visit surveys to evaluate if schoolteachers' expectations are being identified and met. We created pre-visit activities, as well as keeper talk tracking forms to evaluate student learning outcomes. Lastly, we developed observation forms to evaluate the EfC education sessions. These forms can be used to simultaneously evaluate Zoo educators, schoolteachers, and students. The use of these forms is the most efficient way to evaluate, because all three groups affect each other's participation and satisfaction in EfC programs.

5.0 Conclusions and Recommendations

Our research demonstrates that an effective and efficient process for monitoring Zoos Victoria's (ZV) Education for Conservation (EfC) program incorporates four key elements:

1. Zoo Educators: Focus groups in tandem with critical self-reflection journals
2. Schoolteachers: Pre- and Post-visit surveys
3. Students: Pre-visit or on-site activities
4. All Three Groups: Observation and tracking sheets to measure engagement

We recommend that focus groups be conducted quarterly and self-reflection journals be used weekly to assess the sustainability of Zoo educators' demanding roles in EfC. The other three components – surveys to gauge schoolteachers' expectations; pre-visit or on-site activities for students' Zoo preparation; and observation of the collective engagement of educators, schoolteachers, and students – should be conducted annually over a two-week timespan.

5.1 Zoo Educators

Focus groups in tandem with critical self-reflection journals are an effective and efficient way to evaluate the sustainability of ZV's EfC program from the Zoo educators' perspectives.

Critical self-reflection journals (section 4.3) prompt Zoo educators to look back on their week and reflect upon their role as an educator. Focus groups are designed to be a safe place where educators discuss common concerns (as prompted in the reflection journal) and promote communication between the educators and their management. Asking prompting questions such as, "my best experience this week was…" or "I could use help in this area…" encourages educators to open up to each other, offer help to one another, and participate in a meaningful discussion. For more details on the benefits of this method, please see section 4.3.

We recommend that focus groups be held quarterly and follow the same template of questions (as discussed in section 3.1) as the Zoo educator reflection journals. A two hour-long focus group will give sufficient time for participating Zoo educators to share their personal experiences and discuss amongst the group. For Werribee Open Range Zoo and Healesville Sanctuary, less time may be required for focus groups, as these Zoos have fewer educators. Our research shows that educators found focus groups to be a beneficial method for self and group-reflection and that they realized the importance of making time for a focus group each term.

As an alternative to increasing the time limit of EfC educational sessions, *we recommend that ZV conduct a workshop where Zoo educators can talk with one another about which styles or tactics are effective during an educational session.* Zoo educators often go beyond the allotted time for an educational session (as discussed in section 4.2) or leave a session feeling as if students did not get as much information as they could have, especially for age groups that educators feel less comfortable teaching. Educators can learn how to maximize the impact of their educational sessions from one another through the use of team learning. Topics like time management tactics and skills can also be included as part of the Zoo educator focus groups.

Interviews are useful tools that gather detailed opinions and concerns from the Zoo educators, but focus groups are a more simplified and less time-consuming method for gathering similar information.

Due to the time needed to complete interviews, we determined that it is more practical to have the quarterly focus groups. Interviews required about thirty minutes per Zoo educator, and with twelve full-time educators, equated to six hours of time spent. A focus group only takes two hours (or less) to hear concerns from all of the educators at once.

Should ZV wish to continue conducting individual interviews, we recommend they be completed less frequently, possibly annually. The interviews could be used as a check-in or update to discuss concerns that Zoo educators' may not feel comfortable mentioning in the focus group. If educators feel they would benefit from a personal interview, they could request a one. This setup will provide ZV with individual employee insights.

5.2 Schoolteachers

Pre- and post-visit schoolteacher surveys, in combination, are more effective than schoolteacher interviews at gathering meaningful data about teacher expectations and outcomes.

Pre-visit schoolteacher surveys had a high response rate and were more time-efficient than interviews for both the teacher and the evaluator. We observed a clear measure of teacher satisfaction in post-visit responses, as discussed in section 4.5. Interviews were less effective because of the amount of time and effort expended and the reluctance of teachers to talk with us, both in person and over the phone. When conducting phone interviews, we often found teachers gave short, yes or no answers to our questions without any elaboration. During in-person interviews, some teachers were just as limited in their responses, but others talked for far longer than we had intended. The data gathered from these surveys can be seen in section 4.4.

We recommend that ZV send out pre- and post-visit surveys to schoolteachers one week before or after their excursion, at 12:00 P.M., in order to gain the maximum response rate. If sending the surveys at 12:00 P.M. is not plausible, we recommend that ZV utilize an automated sending feature. This feature would automatically send the emails at a specified time from a predetermined list. Our results showed that there was a much higher response rate from schoolteachers when we sent surveys to them at 12:00 P.M. We presume that this time correlates

with when students are eating lunch and teachers are not actively teaching, leaving them with time to check and respond to emails. Sending surveys to teachers one week before their visit provides the best balance between urgency of completion and time for completion.

We recommend that ZV utilize a pleading tone in the emails requesting participation in the pre- and post-visit surveys. The response rate for our pre-visit survey was significantly higher than that of ZV's pre-visit survey. Our sponsor believes the increased response rate was due to the pleading tone used in the request email as well as the mention of student research. We presume that if ZV continues utilizing this tone, it is possible that the removal of "student research" will have less of a negative effect on the response rate.

5.3 Students

Pre-visit or on-site student activities, other than student drawings, can be used to help students prepare for their Zoo visit. These activities are more effective when gauged towards specific age groups.

Based on our survey feedback, we determined that adding diversity to the offered activities increases participation. Our surveys showed that schoolteachers had a clear interest in pre-visit activities but had minimal interest in the student drawing activity. We do not recommend using student drawings because they are too time-consuming for the value of the information gathered.

Our research shows that during the booking process is the optimal time to request that teachers complete pre-visit activities, and doing so will ensure that there is enough time for completion of the activities. If it is not feasible to include in the booking process, we recommend including a link to the activity in the pre-visit schoolteacher survey. The student activities will help the visiting classes be more prepared to participate during their Zoo visit. We further

researched pre-visit activities implemented by other zoos, in addition to recommendations from our post-visit survey, to arrive at two new active-learning-based activities. During the on-site visit, students could go on a "treasure hunt," in which they would be given a punch card (which can be seen in *Appendix O)* and search the Zoo for the animals that are the main focus of some of the educational programs at Zoos Victoria. At the location of each animal, students would have their card marked off, and they would learn a fact about the animal they are viewing. In preparation for the "treasure hunt," students can complete an activity, called *Who am I*, in the classroom before the Zoo visit. Instructions for this activity can be seen in *Appendix P*.

Additional Recommendation:

Photographing students during EfC educational sessions was not an effective way to measure student engagement. However, videos of the sessions were taken alongside the student photographs. *We recommend that these videos be used by Zoo educators for either team learning of different presentation styles and tactics or self-reflection.* The full-length videos provide a full account of how the class was conducted and can serve as a tool for other educators to develop their teaching skills. Additionally, the videos can be used as a self-reflection method as the educators can recognize where they were successful or where improvements could be made. Video cameras can be set up in a discreet location during an education session so that the Zoo educator and students can both be seen and heard without causing a distraction to participants or interfering with the educational session.

5.4 All Three Groups

Observation and tracking sheets are effective tools for simultaneous evaluation of student engagement, schoolteacher behavior and participation, and Zoo educator satisfaction.

The observation sheets have a standardized rubric that contains check boxes, which are marked off by observing how engaged students are, how much of an impact the schoolteacher has on the lesson, and how the Zoo educators behave in certain situations. *We recommend that observations and tracking be completed over a span of two weeks, during the middle of the second or third term of the school year.* A maximum number of educational sessions could be observed during this time. Observing one education location numerous times over a short period will show which aspects of the program are repetitive, effective, or need to be changed. Tracking other educational locations, such as Zookeeper talks or important EfC related exhibits, will show where the students go during their visit, and how engaged they are during the independent portion of their visit.

Additional Recommendation:

Bringing an animal out at the start of an educational session promotes greater student engagement throughout the entirety of the session. In many of our observations we determined that students were more attentive and responsive to Zoo educator lessons when taking part in an animal encounter. Students tended to be calmer, quieter, and more focused. Therefore, we included this topic in our observation and tracking rubrics.

5.5 Future Recommendations

The weakest area of our research was in the student section because we were unable to gather enough data from our research to draw conclusions about student learning. As a result, *we recommend that ZV complete future research on activities that better evaluate student learning.* Our research demonstrates a thorough evaluation of student engagement, but it did not show that students were learning.

Our strongest overall evaluation tool is the observation sheet because it can simultaneously evaluate all three areas. However, we recognize that this tool was established later in the term, leaving less time for development and therefore would benefit from further improvement. Currently, our tool offers efficient evaluation, but further observations may provide more insight into what evaluators should be looking for during educational sessions.

We are leaving Zoos Victoria with practical, efficient, and effective tools for ongoing evaluation of the EfC program. Zoos Victoria and other zoos can use these tools to help improve the impact and reach of their conservation programs. Ongoing evaluation will also provide Zoo staff and educators with professional development, which we believe will lead to higher job satisfaction and organizational growth.

References

Adelman, L., Falk, J., & James, S. (2010). Impact of National Aquarium in Baltimore on Visitors' Conservation Attitudes, Behavior, and Knowledge. *Curator: The Museum Journal,* 33-61.

Andrade, Jose Manuel, Bowe, Kathleen S., Thomas, Patrick Edward, & Vannasse, Aubrie Rose. (2013). *Evaluating Zoo Learning Models*. (Undergraduate Interactive Qualifying Project No. E-project-121613-053121). Retrieved from Worcester Polytechnic Institute Electronic Projects Collection: http://www.wpi.edu/Pubs/E-project/Available/E-project-121613-053121/

Appleton-Knapp, S. L., & Krentler, K. A. (2006). Measuring student expectations and their effects on satisfaction: The importance of managing student expectations. *Journal of marketing education*, *28*(3), 254-264.

Association of Zoos and Aquariums SAFE: Saving Animals from Extinction. (2014). Retrieved September 29, 2015, from https://www.aza.org/SAFE/

Baara, Farrah Munther, Gile, Sean, Kennedy, Robyn L, Santoro, Daria Emily, and Vresilovic, Alexandra Jessie. (2012). *Best Practices and Policy for Lead Poisoning Prevention in Urban Bangkok Communities*. (Undergraduate Interactive Qualifying Project No. E-project-030112-104834). Retrieved from Worcester Polytechnic Institute Electronic Projections Collection: http://www.wpi.edu/Pubs/E-project/Available/E-project-030112-104834/unrestricted/final_iqp_doc.pdf

Colardyn, D., & Bjornavold, J. (2004). Validation of formal, non-formal and informal learning: Policy and practices in EU member states. European Journal of Education, 39(1), 69-89. doi:10.1111/j.0141-8211.2004.00167.x

Carr, N., & Cohen, S. (2011). The public face of zoos: images of entertainment, education and conservation. *Anthrozoös*, *24*(2), 175-189.

Davidson, S., Passmore, C., & Anderson, D. (2009). Learning on Zoo field trips: The interaction of the agendas and practices of students, teachers, and zoo educators. *Science Education Sci. Ed.*

Diamond, J. (1999). *Practical evaluation guide: Tools for museums and other informal educational settings.* Walnut Creek, Calif.: AltaMira Press.

Educators Belongings, Being & Belonging. (2010). Retrieved September 13, 2015, from http://files.acecqa.gov.au/files/National-Quality-Framework-Resources-Kit/educators_guide_to_the_early_years_learning_framework_for_australia.pdf

Education for Conservation. (n.d.). Retrieved September 14, 2015, from http://www.zoo.org.au/education/about

Eshach, H. (2007). Bridging in-school and out-of-school learning: Formal, non-formal, and informal education. *Journal of Science Education and Technology, 16(2),* 171-190. doi:10.1007/s10956-006-9027-1

The Extinction Crisis. (n.d.). Retrieved December 10, 2015, from http://www.biologicaldiversity.org/programs/biodiversity/elements_of_biodiversity/extinction_crisis/

Fetterman, D. (1988). Qualitative Approaches to Evaluating Education. *Educational Researcher, 17*(8), 17-23.

Griffin, J. (2002, November 22). Museum Visitor Experiences and Learning Speaking Notes: Janette Griffin, University of Technology, Sydney. Retrieved November 12, 2015, from http://australianmuseum.net.au/uploads/documents/9322/janetteg.pdf

Hoey, Francis, Miralda, Jean Paul, Tomkinson, Kaleigh, and Tymon, Roxanne. (2012). Assessing *Teacher Expectations of the Learning Experience Programs at Zoos Victoria*. (Undergraduate Interactive Qualifying Project No. E-project-050112-052356). Retrieved from Worcester Polytechnic Institute Electronic Projects Collection: http://www.wpi.edu/Pubs/E-project/Available/E-project-050112-052356/unrestricted/Zoos_Victoria_Final_Report_2012.pdf

Jensen, Eric (2014). Evaluating Children's Conservation Biology Learning at the Zoo. *Conservation Biology,* 1004-1011.

Jensen, Eric (2011). Learning about Animals, Science and Conservation at the Zoo: Large-scale survey-based evaluation of the educational impact of the ZSL London Zoo Formal Learning programme. *University of Warwick and Zoological Society of London.*

Kelly, L. & Bartlett, A. (2002). Tracking & Observation Studies. (2010). Retrieved November 6, 2015, from http://australianmuseum.net.au/uploads/documents/9301/tracking_studies.pdf

Kelly, L. (2010, April 23). Australian Museum - Focus Groups. Retrieved November 5, 2015, from http://australianmuseum.net.au/audience-research-focus-groups

Loh, L., Friedman, S., & Burdick, W. (2013). Factors promoting sustainability of education innovations: A comparison of faculty perceptions and existing frameworks. *Education for Health, 26*(1), 32-38.

Miller, B., Conway, W., Reading, R., Wemmer, C., Wildt, D., Kleiman, D., … Hutchins, M. (2004). Evaluating the Conservation Mission of Zoos, Aquariums, Botanical Gardens, and Natural History Museums. *Conservation Biology, 18*(1), 86-93.

Moss, A., & Esson, M. (2012). The Educational Claims of Zoos: Where Do We Go from Here? *Zoo Biology.* 13-18.

Parker, Martha (2014). Conservation Connections Matter! *International Zoo Educators Association Journal,* 6-10.

Patrick, P. G., Matthews, C. E., Ayers, D. F., & Tunnicliffe, S. D. (2007). Conservation and education: Prominent themes in zoo mission statements. *The Journal of Environmental Education*, *38*(3), 53-60.

Pearson, E., Lowry, R., Dorrian, J., & Litchfield, C. (2014). Evaluating the conservation impact of an innovative zoo-based educational campaign: 'Don't Palm Us Off' for orang-utan conservation. *Zoo Biology,* 184-196.

Poyatos, F. (2002). Nonverbal Communication across Disciplines. Volume 1 : Culture, sensory interaction, speech, conversation. Philadelphia, PA, USA: John Benjamins Publishing Company. Retrieved from http://www.ebrary.com

Randi Korn & Associates. (2014, August 1). Formative Evaluation Safari Adventure. Retrieved November 5, 2015, from http://informalscience.org/images/evaluation/2014-10-23_RKA_2014_WCS_Bronx%20Zoo_Safari%20Adventure%20Prototypes_fnl.pdf

Sanford, Dr. C. (2014). Informing Leadership Practices: Exploring Relationships between Student Engagement in Science and Zoo Education Programs. *International Zoo Educators Association Journal*, 38-41.

Smithsonian Institution (2004, March). THE EVALUATION OF MUSEUM EDUCATIONAL PROGRAMS: A NATIONAL PERSPECTIVE. (2004, March 1). Retrieved November 5, 2015, from https://repository.si.edu/bitstream/handle/10088/17237/opanda_EvaluationMuseumEducationalPrograms.pdf?sequence=1

Swanagan, J. S. (2000). Factors influencing Zoo visitors' conservation attitudes and behavior. *The Journal of Environmental Education*, *31*(4), 26-31.

Thomson, G., & Hoffman, J. (n.d.). Measuring the Success of Environmental Education Programs. Retrieved September 29, 2015, from http://www.promiseofplace.org/research_attachments/ee-success.pdf

Tribe, A., & Booth, R. (2003). Assessing the role of zoos in wildlife conservation. *Human Dimensions of Wildlife*, *8*(1), 65-74.

Weiss, C. (1998). *Evaluation: Methods for Studying Programs and Policies* (2nd ed.). Upper Saddle River, N.J.: Prentice Hall.

White, T., & Jacobson, S. (n.d.). Evaluating Conservation Education Programs at a South American Zoo. Visitor Studies, 207-210.

Wilson, E. (1992). *The Diversity of Life*. Cambridge, MA: Harvard University Press, 277.

Zhou, C., Purushothaman, A. & Rongbutsri, N. (2013). Facilitating Sustainability of Education by Problem-Based Learning (PBL) and Information and Communication Technology (ICT). International Journal of Emerging Technologies in Learning (iJET), 8(6), 50-54.

Appendices

Appendix A: Educator Interview

Educator Interview

Meeting date:

Meeting location:

Interviewer

Interviewee

Contact Info _____

Consent Given _____

We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are conducting focus groups with Zoos Victoria Education Officers to learn more about conservation education at Zoos Victoria. Our goal is to offer Education Officers evaluation tools to better understand their perspective on the sustainability of the Education for Conservation initiative.

Your participation in this interview is completely voluntary and you may withdraw at any time. If you would like, we would be happy to include your comments as anonymous, though your individualized feedback would help better address your concerns.

Interview Questions

1. *Question: Tell me a story about your favourite experience working at Zoos Victoria*

Answer:

Follow-up Question: What age group were you teaching or who did you teach?

Answer:

2. *Question: Tell me about your least favorite experience working at Zoos Victoria*

Answer:

Follow-up Question: Were there any circumstances, such as students not paying attention, that contributed to this being your least favorite experience?

Answer:

3. *Question: Have you ever felt uncomfortable teaching one of your lessons?*

Answer:

Follow-up Question: What do you think could have made you feel more comfortable in this situation? Skills, knowledge, planning, etc.?

Answer:

4. *Question: What was the most stressful part of your day today?*

Answer:

5. *Question: What age group is your favourite to teach and why?*

Answer:

Possible Follow-up Question: Do you have a least favourite age group to teach and why?

Answer:

6. *Question: How has the transition to the new model felt? Have you been stressed, felt uncomfortable, etc?*

Answer:

Possible Follow-up Question: Is there anything that you have struggled with? Do you feel like you have the skill set to deliver this new style of education at Zoos Victoria?

Answer:

7. *Question: Have you had any prior experiences working as a zoo educator and are there any recognizable differences between them and Zoos Victoria that stand out to you?*

Answer:

Possible Follow-up Question: What is your motivation for working at Zoos Victoria?

Answer:

Other comments:

Appendix B: Educator Self-Reflection Journal

ZOOS VICTORIA — WERRIBEE, MELBOURNE, HEALESVILLE

Educator Reflection

Please take 5 minutes at the end of your week to reflect on your weekly teachings for Learning Experiences. This evaluation is for your own use and your eyes only.

General Information

Educator		**Date/ Time**	

EfC Experiences

Something great that happened this week was:

Comments:

The worst thing that happened this week was:

Comments:

Areas for Personal/Team Improvements

I think I need help with:

Comments:

I think this worked great this week:

Comments:

I think I could help others with:

Comments:

Additional Comments or Concerns

Appendix C: Educator Focus Group Agenda

Educator Focus Group

Meeting date_____ Meeting location _____

Facilitator _____

Note taker _____

Attendees:_____

We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are conducting focus groups with Zoos Victoria Education Officers to learn more about conservation education at Zoos Victoria. Our goal is to offer Education Officers evaluation tools to better understand their perspective on the sustainability of the Education for Conservation initiative.

Your participation in this focus group is completely voluntary and you may withdraw at any time. If you would like, we would be happy to include your comments as anonymous, though your individualized feedback would help better address your concerns.

TOPICS FOR DISCUSSION

Agenda topic: *Initial reactions to this week's education: what went right/ wrong? Did anything out of the ordinary happen at the zoo this week? Comment on any reoccurring issues from previous week, and on issues that have been resolved.*

Discussion:_____

Conclusion:_____

Follow-up Action Plan for Future Improvement	Person Responsible	Deadline
[Topic]	[Presenter]	[Date | time]
[Topic]	[Presenter]	[Date | time]

Agenda topic: *Did you feel that you have all the necessary skills to complete your tasks? What skills would make you an even better educator?*

Discussion:_____

Conclusion:_____

Follow-up Action Plan for Future Improvement	Person Responsible	Deadline
[Topic]	[Presenter]	[Date | time]
[Topic]	[Presenter]	[Date | time]

Agenda topic: Do you feel that your daily lessons help deliver the EfC standards of Zoos Victoria? *What could have gone better? What could be improved? What could be changed?*

Discussion: _____

_____

_____

Conclusion: _____

_____

Follow-up Action Plan for Future Improvement	Person Responsible	Deadline
[Topic]	[Presenter]	[Date | time]
[Topic]	[Presenter]	[Date | time]

Additional Comments and Concerns: _____

_____

_____

_____

_____

Appendix D: Pre-Visit Teacher Survey

Zoos Victoria Pre-Excursion Teacher Survey

Thank you for taking the time to give us feedback on the Zoos Victoria excursions. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA and we are working with teachers who are visiting Zoos Victoria with their students to help the Education Team better understand the expectations of visiting teachers. Currently, we are conducting a survey of teachers to better understand the reasons why you come to Zoos Victoria and help us better deliver lessons that meet your students learning outcomes.

Your participation in this survey is completely voluntary and you may withdraw at any time. Please note: No names or identifying information will appear in any of project reports or publications, and contact information will only be used if requested in the comments section.

Thank you again for your participation, your answers will help Zoos Victoria deliver the best education experiences possible for students and teachers across Victoria.

* Required

What is the date of your visit? *

mm/dd/yyyy

Which property are you visiting? *

- Melbourne Zoo
- Healesville Sanctuary
- Werribee Open Range Zoo

What is Your Full Name? *

What school are you visiting from? *

Have you ever participated in this zoo excursion before? *

- Yes
- No

What is the year level of your group? *

Are you bringing adult/parent helpers? *

- Yes
- No

Continue »

What is the role of the helper?

« Back Continue »

What level of exposure do your students have to wildlife conservation education?

Why are you bringing your students to the zoo?

What topics and concepts do you hope your students will learn during their zoo excursion?

What change do you hope to see in student knowledge and attitudes after their zoo excursion?

How often is wildlife conservation discussed in your classroom?

What do you believe is the mission of Zoos Victoria?

If you have any other comments please share them below.

When is the best time to contact you in the future?

--:-- --

Example: 11:00 AM

Would you be interested in completing a pre-excursion activity with your class? *

Please note that this activity is targeted toward years 6 and under

- ○ Yes; this will send you to the activity
- ○ No

« Back Continue »

Drawing Activity.

If you are interested in completing a drawing activity with your students, please click on the following link before submitting this form.

https://drive.google.com/file/d/0B9W270Buy9CdaTZRUXFWWm5vY3M/view?usp=sharing

Do you intend on completing this activity with your class? *

- ○ Yes
- ○ No

« Back Submit

Appendix E: Post-Visit Teacher Survey

Zoos Victoria Post-Excursion Teacher Survey

Thank you for taking the time to give us feedback on your excursion with Zoos Victoria. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA and we are working with teachers who are visiting Zoos Victoria with their students to help the Education Team better understand the experience of visiting students and teachers. Currently, we are conducting a survey of teachers to better understand the Zoo excursion experience help us to develop better experiences that meet your students learning outcomes.

Your participation in this survey is completely voluntary and you may withdraw at any time. Please note: No names or identifying information will appear in any of project reports or publications, and contact information will only be used if requested in the comments section.

Thank you again for your participation, your answers will help Zoos Victoria deliver the best education experiences possible for students and teachers across Victoria.

* Required

What is the location of your Zoo Excursion *

- ○ Melbourne Zoo
- ○ Healesville Sanctuary
- ○ Werribee Open Range Zoo

What was the date of your visit? *

mm/dd/yyyy

What is your name?

You are not obligated to give your name

What school are you from?

What is the year level of your group? *

How many students visited from your school? *

How many adult or parent helpers visited? *

What was the role of your adult or parent helpers

What activities did your students participate in at the zoo?

What did your students enjoy most during their time at the zoo?

How well were your expectations of the zoo visit met? *

	1	2	3	4	5	
Not Met	○	○	○	○	○	Exceeded Expectations

Do you have any other comments?

If you would like to receive our teacher E-News emails, please enter your email here:

Appendix F: Teacher Pre-Visit Interview

Teacher Pre-Visit Interview

Meeting date_____ Meeting location _____

Interviewer	_____	Contact Info	_____
Interviewee	_____	Consent Given	_____

We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are conducting focus groups with Zoos Victoria Education Officers to learn more about conservation education at Zoos Victoria. Our goal is to offer Education Officers evaluation tools to better understand their perspective on the sustainability of the Education for Conservation initiative.

Your participation in this interview is completely voluntary and you may withdraw at any time. If you would like, we would be happy to include your comments as anonymous, though your individualized feedback would help better address your concerns.

INTERVIEW QUESTIONS

1. Question: *Why are you bringing your students to the zoo?*

Answer:_____
_____
_____

2. Question: *What level of exposure do your students have to conservation education on a regular basis?*

Answer:_____
_____
_____

3. Question: *How often is conservation education discussed in the classroom?*

Answer:_____
_____
_____

4. Question: *What do you expect your students to take away from your zoo trip?*

Answer:_____
_____
_____

5. Question: *What specific topics do you hope Zoos Victoria can help your students learn?*

Answer:_____
_____
_____

6. Question: *What do you believe is the mission of Zoos Victoria?*

Answer:_____

7. Question: *What change do you expect to see in student attitudes and behaviors after their zoo experience?*

Answer:_____

8. Question: *Do you think teachers (including yourself) would be willing to fill out a survey before coming to the zoo?*

Answer:_____

9. Question: *Would you rather be interviewed or fill out an open-ended survey? Please explain.*

Answer:_____

10. Question: *Would you be more willing to fill out surveys if they were multiple choice as opposed to open-ended?*

Answer:_____

Appendix G: Drawing Instructions

Zoos Victoria Evaluation Project - Student Drawing

Background: Zoos Victoria is undertaking evaluation of Education for Conservation, a new education model. In order to try and evaluate student learning for groups in Grade 3-6 we are undertaking drawing assessment.

Aim: Through student drawings we are hoping to gain a better understanding of what students know and learn as a result of an excursion to the Zoo. By using pre and post excursion drawings, we hope to be able to gauge the level of student learning and engagement occurring on an excursion to one of our sites.

What we want you to know: These drawings are purely for internal assessment purposes only. Please be aware that we are unable to return student drawings to you.

Activity Outline
Resources required: A4 paper and pencils, crayons or markers

Before your excursion:

- Group students into teams of 4-5
- Ask students (as a part of a group) to draw a labelled picture of the role of the zoo.
  Note: Limit drawing time to 15 minutes.
- Once the drawings are complete ask students to write their first names, their year level and school on the back of the picture.
- Submit your student's drawings to the Zoos Victoria Education Officer on the day of your school excursion.

After your excursion:

- Ask your students to form into their original groups and draw a labelled picture of the role of the zoo.
  Note: Limit drawing time to 15 minutes
- Once the pictures are complete ask the students to write their first names, their year level and school on the back of the picture. Place completed drawings into the pre-paid envelope provided and send to Zoos Victoria.

Lastly thank you for your assistance, you and your student's participation in this activity is helping to make Zoos Victoria excursions better for teachers and students everywhere across Victoria.

If you have any questions please contact Zoos Victoria Learning team on 9340 2778.

Appendix H: Drawing Rubric and Collection Sheet

Initial Drawing

	Initial Drawing				
Picture Group Number	Conservation Expression (0-1)	Accurate Labeling (0-1)	Accurate Placement (0-1)	Elaboration of Animal Drawings (0-1)	Total Score
1	0.5	0	0	0.5	1
2	1	1	0	0.5	2.5

Post-Visit Drawing

Post Drawing (Improvements, if any)							
Conservation Expression (0-1)	Accurate Labeling (0-1)	Accurate Placement (0-1)	Elaboration of Animal Drawings (0-1)	Total Score	Percent Change	Improvement (0 or 1)	Inclusion of Information from Trip (Yes or No)
0	1	1	0	2	100		Yes
0	0	1	0.5	1.5	-40		No
	Rubric						
	0	No					
	0.5	Some					
	1	Yes					

Appendix I: Letters of Consent

Zoos Victoria
Werribee Open Range Zoo: 03 9731 9601
Melbourne Zoo: 03 9285 9355
Healesville Sanctuary: 03 5957 2818

Parental Informed Consent Form

We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA. We are conducting research with Zoos Victoria Education Officers to learn more about conservation education at Zoos Victoria.

You have been invited to let your child participate in the evaluation of student engagement at Zoos Victoria. The following information is provided for you to make an informed decision on whether you want to allow your child to participate. If you have any questions, please ask.

Your child is able to participate in this evaluation study because they fall under one of the categories we are looking to observe. Your child has been selected to participate because his or her class has chosen to attend an educational program at Zoos Victoria.

We are working on evaluating student engagement, teacher expectations, and zoo educator opinions on the longevity of the educational programs. In order to complete the student observation, we intend on taking photographs and audio recordings at exhibits throughout the day. This will only be happening two to three times a week, so your student may not be observed. We would like for your student to participate in our evaluation to help us better the programs offered at Zoos Victoria.

There are no known risks associated with participating in this evaluation study. Any information collected will remain confidential and remain within Zoos Victoria unless you should specifically request the information be released. The information obtained through our observations will help improve the educational programs offered at Zoos Victoria, but your child's identity will remain confidential.

_____ _____

Signature of Parent Date

Your child's rights to participate have been explained to you. If you have any additional questions about your child's rights, you may feel free to contact the Zoo which your child is visiting at the corresponding number as seen above.

Zoos Victoria
Werribee Open Range Zoo: 03 9731 9601
Melbourne Zoo: 03 9285 9355
Healesville Sanctuary: 03 5957 2818

Child Assent Form

To Whom It May Concern:

1. We are a group of students from Worcester Polytechnic Institute in Massachusetts, USA, working on evaluating student engagement, teacher expectations, and zoo educator opinions on the longevity of the educational programs. We would like for you to participate in our evaluation to help us better the programs offered at Zoos Victoria. You are eligible to partake in this evaluation because you fall under one of the categories we are looking to observe.

2. Please discuss with your parents before you decide whether you will participate. Your parents will also be asked to give permission for you to participate in this study.

3. If you ever have any questions, please ask.

4. All we ask is that you go on your zoo visit as you would if there was no observation being completed. Our observation methods include photographs and audio recording of conversations around the exhibits. Our goal is to observe and understand student engagement with the educational programs offered.

5. We will observe different exhibits multiple times a day two to three times a week. This means that you may not be photographed or recorded at all.

6. Your participation will help us to better the educational programs offered at Zoos Victoria.

You are deciding whether you wish to partake in the student observation. By signing this form, you are consenting to participate and have read everything written on this form. Should you decide, you may choose to withdraw and no longer participate. You and your parents will be given a copy of this assent form to keep.

_____ _____

Signature of Subject Date

_____ _____

Signature of Investigator Date

Appendix J: Photograph Rubric

	Engaged	Total Number of Occurrences	Disengaged	Total Number of Occurrences
Date and Exhibit	Facing Exhibit		Not looking (Faced away)	
	Gesturing Toward Exhibit		On Phone	
	Close Proximity		Far Away	
	Other (Best Judgement)		Other (Best Judgement)	
	Discussion about the exhibit		Talking about other things	
	Total:	0	Total:	0

Appendix K: Correlation Table

Theme From Observations	Occurrences			
	Session 1	Session 2	Session 3	Session 4
Educator was on time to less and had plenty of time to set up				
Educator engaging students who aren't participating				
Educator tailored talk to curriculum				
Educator has control over the class				
Educator at ease when students are participating				
Educator stayed within the time limit				
Educator being rushed				
Teacher was not involved with education session				
Teacher helped the educator reengage the students				
Teacher was on time to lesson				
Teacher walked around during group activities and participated with the students				
Teacher/chaperone on the phone				
Students were excited to ask or answer questions				
Students were engaged with educator				
Students went towards interactive activities				
Students socializing instead of participating in lesson				
Students had to be pushed to answer questions				
Students had their phones ours				
Students were late to session (3 or more)				
Students were distracted by animals on display				
Students fidgeting (playing with lanyards, backpacks, etc.				
Temperature (in degrees Celcius)				
Animal Encounter (Beginning, middle or end)				
Educator Talk # of the day				

Appendix L: Observation Sheet

ZOOS VICTORIA — WERRIBEE · MELBOURNE · HEALESVILLE

Education Session Observation Sheet

General Information

Evaluator		**ZV Educator**		**Date/ Time**	
Zoo Location		**Program**		**Topic/Focus**	
School/ Year		**# of Teacher/ Helpers**		**# of Students**	

Check the boxes that apply.

Educator Satisfaction/ teaching observations

- ☐ Educator was on time to lesson and had plenty of time to set up lesson.
- ☐ Educator engaged students who weren't participating.
- ☐ Educator successfully tailored the talk towards students' curriculum.
- ☐ Educator had control over the class.
- ☐ Educator at ease when students participated.
- ☐ Educator stayed within time limit.
- ☐ Educator rushed through presentation

Teacher engagement/participation observations

- ☐ Teacher was not involved with education session.
- ☐ Teacher helped the educator reengage the students.
- ☐ Teacher was on time to lesson.
- ☐ Teacher walked around during group activities and participated with the students.
- ☐ Teacher was on their phone.

Student engagement/participation observations

- ☐ Students were excited to ask or answer questions.
- ☐ Students were engaged with the educator.
- ☐ Students went towards interactive activities.
- ☐ Students socializing instead of participating in lesson.
- ☐ Students had to be pushed to answer questions.
- ☐ Students had their phones out.
- ☐ Students were late to session. (3 or more)
- ☐ Students were distracted by animals on display.
- ☐ Students were fidgeting. (playing with lanyards, backpacks, etc.)

Variables

Temperature	_____ °C	**Animal Encounter**	Beginning - Middle - End	**Educator Talk # of the day**	

Comments

Appendix M: Pleading Pre-Visit Survey Email

Dear [Insert Schoolteacher's Name],

Thank you for your excursion booking with Zoos Victoria. We look forward to meeting you and your students at Melbourne Zoo soon.
We are always working towards providing the best student excursion we can at each of our sites. To help us achieve this we have commissioned a group of research students to undertake a review of our program and evaluation tools. To ensure that we are meeting the learning needs of students we would be grateful any feedback that you can offer us. We have created a pre-excursion survey that will help us understand how teachers are using the Zoo in relation to their teaching and student learning. The survey should take no more than 5 minutes of your time and will help us prepare a better experience for you and your students. You can find the link to the pre-excursion survey here. If you have any additional teachers attending your Zoo excursion we would appreciate you forwarding this email to them for their thoughts and comments.
We thank you in advance for your participation, your responses will help ensure that our education programs are meeting the needs of Victorian students. If you have any questions please feel free to contact us.

Kind regards,
Cyrelle
You can also find the link to the Zoos Victoria pre excursion survey here:
https://docs.google.com/forms/d/1_4kmFqmMcBGPm1ODFPwInUFGvC6GNUkfP9VCVjP69rg/viewform

Cyrelle Field | Learning Programs Co-ordinator
Zoos Victoria | Elliott Avenue | Parkville VIC 3052

Appendix N: Keeper Talk Observation Sheet

Zoo Keeper Talk Observation Form

General Information			
Evaluator		**Date**	
Exhibit		**Time**	

General Observations			
Did keeper talk begin on time?	☐ Early	☐ On-time	☐ Late
Talk demographic - majority of talk attendees are:	☐ School	☐ Equal	☐ Public
Keeper's language/questions geared towards:	☐ School	☐ Neutral	☐ Public
Exhibit variables - amount of shade:	☐ Minimal	☐ Some	☐ Plenty
Exhibit variables - attendees are:	☐ Standing	☐ Both	☐ Sitting
Exhibit variables - exhibit space is:	☐ Cramped	☐ Neutral	☐ Spacious
Where is the keeper located during the talk?	☐ In front of exhibit - see and hear keeper ☐ Behind exhibit - only hear keeper, no visual		
How many public visitors attended keeper talk?	☐ 0-9 ☐ 10-19 ☐ 20-29 ☐ 30-39 ☐ 40+		
Keeper talk length: (minutes)	☐ 0-4 ☐5-9 ☐ 10-15 ☐ 15-20 ☐ 20+		

General Student/Teacher Observations		
Number of student groups: _____	***Tally the number of occurrences***	
Number of students in each group.	____ 0-9 ____ 10-19 ____ 20-29 ____ 30-39 ____ 40-49 ____ 50+	
At what point did each group arrive at the keeper talk?	____ Early ____ Middle (late)	____ Beginning (on time) ____ End (miss it)
How long did each group spend at the keeper talk?	____ 0 to 5 minutes ____ 10 to 15 minutes	____ 5 to 10 minutes ____ Full Talk
How engaged was each group with the keeper talk?	____ "Running" Around ____ Socializing	____ Looking at Animals ____ Asking Keeper Questions
What role did teacher/helper play in the keeper talk?	____ "Taking a Break" ____ Engaging Students	____Wrangling Students ____ Engaged w/ Speaker

Comments:_____

_____

_____

_____

Appendix O: On-Site Activity Punch Card

Guthega Skinks  Only found in one area in Victoria and another in NSW, but these populations have not been connected for millions of years.	**Helmeted Honeyeaters**  Zoos Victoria has been involved in their captive breeding since their Recovery Program began in 1989.	**Leadbeater's Possums**  Their habitats are being destroyed due to logging and wildfires. They are threatened as a result of this.
Mountain Pygmy Possums  There are thought to be less than 2,000 Mountain Pygmy Possums left in the world.	**Orange-bellied Parrots**  There are estimated to be fewer than 50 Orange-bellied Parrots left in the wild.	**She-oak Skinks**  She-oak Skinks are only found in four locations in Victoria, as well as a scattering of locations in NSW.
Southern Corroboree Frogs  There are less than 50 Southern Corroboree Frogs left in the world.	**Spotted Tree Frogs**  Spotted Tree Frogs now only occur in a few reaches of rocky mountain streams in just 13 river systems.	**Tasmanian Devils**  Tasmanian Devils are only found in the wild in Tasmania, but they used to be found on the mainland as well.

Appendix P: Pre-Visit Activity Instructions

Who am I?

Background

- This activity will help students think about the different characteristics of animals.
- It will help students formulate questions and analyze responses and ask questions properly.
- *This is a good way to assess how much the students know about the given animals prior to their Zoo visit.

Activity

- Tape a picture of one of Zoos Victoria's threatened species (pictures provided) to the back of each student. Make sure the student does not know what animal they have.
- Students then ask each other yes or no questions to learn what animal they are.
- After completing the activity, you can use the provided information to help students learn more information about the animals they were.

Guthega Skinks  Only found in one area in Victoria and another in NSW, but these populations have not been connected for millions of years.	**Helmeted Honeyeaters**  Zoos Victoria has been involved in their captive breeding since their Recovery Program began in 1989.	**Leadbeater's Possums**  Their habitats are being destroyed due to logging and wildfires. They are threatened as a result of this.
Mountain Pygmy Possums  There are thought to be less than 2,000 Mountain Pygmy Possums left in the world.	**Orange-bellied Parrots**  There are estimated to be fewer than 50 Orange-bellied Parrots left in the wild.	**She-oak Skinks**  She-oak Skinks are only found in four locations in Victoria, as well as a scattering of locations in NSW.
Southern Corroboree Frogs  There are less than 50 Southern Corroboree Frogs left in the world.	**Spotted Tree Frogs**  Spotted Tree Frogs now only occur in a few reaches of rocky mountain streams in just 13 river systems.	**Tasmanian Devils**  Tasmanian Devils are only found in the wild in Tasmania, but they used to be found on the mainland as well.

Appendix Q: Team Assessment

Our team was able to complete our project in an effective and time efficient manner. We stayed on track by continuously referring to our detailed timetable that we created the second day of work. We checked this timetable every morning to ensure that we were accomplishing all of our tasks and meeting all of our deadlines. We also used the timetable to split up the work between the four of us, as there would have been too much work to complete as a group of four. Oftentimes, we divided into teams of two and met up afterwards to share with each other what we found so that everyone was always kept up to date.

Throughout the term we recognized the strengths and weaknesses of our team and played on our strengths. Some of us had strong writing skills, another had exemplary visual skills and created our presentations and our evaluation sheets, while another was able to edit our assignments with a critical eye. Additionally, we made sure to check in with each other about how we felt about our progress. We made it a point to voice concerns as soon as possible to avoid future conflicts and address issues before they negatively impacted our project. After receiving feedback on our chapters, we made sure that everyone's opinions about changes were heard and discussed before moving forward. During our first formative evaluation, we recognized specific areas for improvement, such as: talking more in meetings, working on our writing skills, being more positive, and improving our public speaking skills. Throughout the term, we continued to address these areas and helped each other continually improve.

Over the course of the term, we continuously took the advisor's comments and used them to reach our greatest potential. We went through all of the comments as a group to ensure we agreed with the intended changes. Our communication with the advisors was critical to our success, as they were able to answer important questions about content.

In the future, we could work on our patience in not getting irritated with one another as easily. When deadlines are approaching and everyone is stressed, it is easy to snap at team members for small disagreements. We will continue working to improve our attitudes and avoid this type of confrontation.

Appendix R: One Page Summary of Conclusions

Our research demonstrates that an effective and efficient process for evaluating Zoos Victoria's (ZV) Education for Conservation (EfC) program incorporates four key elements:

1. Zoo Educators: Focus groups in tandem with critical self-reflection journals

Focus groups, utilized at the end of each school quarter, provide Zoo educators with a safe space to collectively discuss their concerns and experiences. Weekly self-reflection journals will help the educators to reflect individually, as well as prepare for the quarterly focus group. Most importantly, educators can discuss their strengths and weaknesses, and offer advice to help one another. After one such session, one educator said, "I feel like we've purged," expressing the common consensus that the focus groups were beneficial. Through our focus groups, the educators expressed that they now recognize the importance of self and group reflection and agreed that they needed to put aside the necessary time to complete this exercise.

2. School Teachers: Pre- and Post-visit surveys

The surveys received a 28% response rate and were an efficient tool for data collection. The optimal time to send the surveys was at 12:00 PM, one week before and after the Zoo visit. The pleading tone of the email requesting the surveys likely aided in the high response rate.

3. Students: Pre-visit or on-site activities

The addition of pre-visit and on-site activities will help students prepare for their visit, allowing them to get the most of the educational sessions and visit as a whole.

4. All three groups: Observation and tracking sheets to measure engagement

Simultaneous evaluation of all three groups can be completed with observation sheets that measure engagement of students, participation of school teachers, and satisfaction of Zoo educators. Combining all three groups leaves ZV with an efficient and effective tool for ongoing evaluation of the EfC program.