Residential Camps about Biodiversity and Wildlife Conservation for School Children

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Declaration

This thesis is presented as a series of chapters which form the basis of manuscripts that will be submitted for publication in peer reviewed journals. All of the observations, surveys, interviews and data analysis are my original work. Data were collected when I was enrolled at the University of Western Australia. When my primary supervisor moved to the University of Otago, I transferred, finished analysing the data and wrote the thesis in Dunedin, New Zealand. Professor Nancy Longnecker contributed to research design, method development, suggested relevant literature, and reviewed all the chapters.
Abstract

Illegal wildlife trading and habitat destruction have increased in Thailand in recent decades. While there has been research in this area, much of it has focused on sustainable development. In addition to focusing on sustainable development, there should be more work on educating Thai people with an ultimate aim of increasing pro-environmental behaviour, especially in the younger generation. There have been no previous research studies focusing on education of young Thai people to assume stewardship or adopt pro-environmental behaviours.

This research study has been conducted with an aim to improve communication activities about biodiversity and wildlife conservation for Thai children. The research consisted of five components: a literature review; interviews of camp educators; case studies of an Australian environmental education camp (Perth Zoo camp) and of a Thai environmental education camp (SERS camp); and development of a model for improved communication about biodiversity and wildlife conservation for Thai children. Mixed methods were used for data collection in the first three components.

For the fifth component, results from the findings of the other components were integrated and considered with special attention to factors that influence children’s engagement and children’s knowledge. This integration was used as the basis for the development of a model for communicating biodiversity and wildlife conservation in Thailand. The model was also influenced by the Theory of Planned Behaviour. A plan for implementing the model is suggested.
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### Abbreviations

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<th>Description</th>
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<tr>
<td>ASEAN WEN</td>
<td>The Association of Southeast Asian Nations Wildlife Enforcement Network</td>
</tr>
<tr>
<td>BIOTEC</td>
<td>National Center for Genetic Engineering and Biotechnology</td>
</tr>
<tr>
<td>BRT</td>
<td>Biodiversity Research and Training Program</td>
</tr>
<tr>
<td>CITES</td>
<td>Convention on International Trade in Endangered Species of wild fauna and flora</td>
</tr>
<tr>
<td>DNPWP</td>
<td>The Department of National Parks, Wildlife and Plant Conservation</td>
</tr>
<tr>
<td>MOST</td>
<td>Ministry of Science and Technology</td>
</tr>
<tr>
<td>SERS</td>
<td>Sakaerat Environmental Research Station, Thailand</td>
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<tr>
<td>Thailand WEN</td>
<td>Thailand Wildlife Enforcement Network</td>
</tr>
<tr>
<td>TISTR</td>
<td>Thailand Institute of Scientific and Technological Research</td>
</tr>
<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
</tr>
<tr>
<td>UWA</td>
<td>The University of Western Australia</td>
</tr>
<tr>
<td>WARPA</td>
<td>Wild Animal Reservation and Protection Act of 1992</td>
</tr>
<tr>
<td>WWF</td>
<td>World Wide Fund for Nature</td>
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Acknowledgements

This thesis is dedicated to my son Nathan, who gave me the inspiration to conduct this research. Nathan loves exploring nature and wildlife. He always gets excited to see birds nesting in our backyard. He will keep an eye on birds’ eggs until they hatch. His kind-heartedness inspired me to find a way to encourage young children in Thailand to care for nature and wildlife. Unfortunately, Nathan had to live without the presence of his mother for five years to allow me to fully concentrate on the research, the biggest sacrifice of a nine year old boy worthy of my pride.

I would also like to thank my family and my partner for their love and support all along. I would not be able to achieve anything without them. I would like to thank my friends in Bangkok, Perth, and Dunedin for their friendships, guidance, and encouragement. These years have been really tough for me and I would not have made it through without them. I would like to give special thanks to Nath Sirikhan, Jan Chaloeyphochana, and Jean Fletcher for their advice on English language, Ricardo Taniwaki for his guidance on statistics work and Geoffrey Cannard for proofreading my final draft.

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Chapter 1: General Introduction

This research examined characteristics and impact of biodiversity and wildlife conservation camps for school children. It examined characteristics of camp educators and documented some of the many science communication activities that relate to biodiversity and wildlife conservation in Western Australia and Thailand, using an overnight camp held at Perth Zoo and a residential camp at the Sakaerat Environmental Research Station (SERS) as case studies. The objectives of this research were:

- To characterise approaches to communication of biodiversity and wildlife conservation used by camp educators in Australia and Thailand;
- To examine challenges for effective biodiversity and wildlife conservation programs; and
- To consider approaches most likely to be effective in Thailand and establish an improved model for communicating biodiversity and wildlife conservation issues to Thai children.

1.1 Research rationale

Biodiversity and wildlife losses are issues of great concern among scientists, conservationists and some members of the public. Biodiversity and wildlife losses are mainly caused by development of human infrastructure and human behaviour. However, many people around the world are unaware that their actions have an impact on the environment as they are increasingly disconnected from nature, especially in urban areas (Miller, 2005). According to Miller (2005), most people who live in urban areas tend to have less meaningful interactions with nature, and are therefore less likely to protect wildlife or support the prevention of habitat loss and biodiversity degradation. Children are important stakeholders of the world’s future. They could play an important role in
solving biodiversity loss problems if they have enough knowledge on the issue (McKeown, Hopkins, Rizi, & Chrystalbridge, 2002). They are more likely to show a greater interest and appreciation of the environment later in life if they explored nature during their childhood (Bixler, Floyd, & Hammitt, 2002). Therefore, by exposing children to the natural environment (Louv, 2005), they are more likely to appreciate the value of nature and its relevance to their lives and become more motivated to undertake environmentally responsible behaviours.

As such, it is important to understand the impact of environmental education programs on children, especially children in Southeast Asia where high rates of deforestation and wildlife trade are reported (Sodhi, Koh, Brook, & Ng, 2004). Children who participate in such programs are more likely to develop a sense of appreciation of nature, connect with nature, and become responsible citizens (Armstrong & Impara, 1991). However, there are limited studies about environmental education programs for school children in Southeast Asia, where the study of the impact of biodiversity and wildlife conservation messages on school children is essential for development of effective environmental education programs. To my knowledge, no research in this area has been conducted with children in Thailand.

**Need for biodiversity and wildlife conservation in Thailand**

Thailand has a history of rich natural resources and varied forest species (Arbhabhirama, Phantomvanit, Elkington, & Ingkasuwan, 1988). But by the end of the twentieth century, Thailand had the highest rate of deforestation among Southeast Asian countries (Hirsch, 1990). Most deforestation in Thailand is the result of agricultural expansion and logging. In order to improve the situation, the Royal Forestry Department and other Thai and international agencies have implemented a number of rehabilitation programs to protect
and increase forest reserves. However, deforestation continues because of a complex relationship between poverty and forest clearance (Fisher & Hirsch, 2008).

According to Fisher and Hirsch (2008), poor people in rural areas of Thailand destroy biodiversity by using natural resources in an unsustainable way. Some cut down trees for growing crops and some hunt local animals for the illegal wildlife trade (see discussion in Chapter 5). These actions continue to challenge biodiversity and wildlife conservation in Thailand and have caused the extinction of species such as Schombergk’s deer (*Cervus schomburgk*) and Kouprey (*Bos sauveli*) (Pattanavibool & Dearden, 2002).

Furthermore, for decades, there have been a number of practices where wild animals are captured for illegal purposes. One example is when baby elephants are taken from their mothers and used in capital city streets as beggars for money (Lohanan, 2002). Despite the fact that this is animal cruelty, the majority of Thai citizens, especially young children, are not aware that by giving food and money, they actually perpetuate this practice. It is therefore important that children have a better understanding of how wildlife should be protected.

As problems occur, the Thai government makes policies on biodiversity and wildlife conservation. The Department of National Parks, Wildlife and Plant Conservation (DNPWP) is responsible for implementing government policies. In 2010, DNPWP initiated a program to stop illegal wildlife hunting and trading. In the same year, the Department also set up the ASEAN Wildlife Enforcement Network (ASEAN WEN) and Thailand Wildlife Enforcement Network (Thailand WEN) to help protect wildlife in the region as well as promote wildlife conservation to the public (Department of National Parks Wildlife and Plant Conservation, n.d.).
Engaging young children with awareness and knowledge of environmental degradation promotes young children’s thinking and contributes to positive action towards the issue (Taylor, Quinn, & Eames, 2015). To engage young children, an effective biodiversity and wildlife conservation education program is needed in Thailand. In order to introduce effective biodiversity and wildlife conservation education programs in Thailand, characteristics and challenges of existing biodiversity and wildlife conservation programs for school children should be examined.

Need for biodiversity and wildlife conservation in Western Australia

Western Australia is one of the most biodiverse regions in the world but is facing severe biodiversity loss (Brooks et al., 2002) exacerbated by habitat destruction and fragmentation (Beresford et al., 2001; Stenhouse, 2004), urban infill and suburban sprawl (Grose, 2009) and a mining boom (Brueckner, Durey, Mayes, & Pforr, 2013). Mining in Western Australia is a major contributor to Western Australia's economy as it provides income and jobs. However, it also causes landscape changes, biodiversity loss, and environmental contamination (Roche & Mudd, 2014). Local communities, scholars, and government agencies have raised concerns about these issues (Gregory, Ward, & John, 2009; Roche & Mudd, 2014). Many studies have been conducted to help manage the impacts of mining in Western Australia (Kujala, Whitehead, Morris, & Wintle, 2015). Cumulative impacts that mining bring such as erosion, seepage, mine tailings and waste rock are leading to biodiversity loss in Western Australia (Franks, Brereton, & Moran, 2010). A super-sized open-cut mine known as the Super Pit in Kalgoorlie yielded 460.6 tons of gold as well as 228 Mt of tailings and 1,257 Mt of waste rock since 1989 (Mudd, 2009). The pit caused air pollution, damage to water resources, and significant changes to the Kalgoorlie landscape and ecosystems (Roche & Mudd, 2014). Kalgoorlie residents are also confronted with dust build-up in their houses and rainwater tanks and a mountainous
horizon of waste rock behind the town (Mudd, 2009). In the Pilbara region of Western Australia, a proposed iron ore mine was granted permission to mine in a particular mesa which was the habitat for subterranean fauna (Majer, 2014). This mining is an obvious threat to these species and ecosystems.

In addition to mining, another obvious challenge to biodiversity in Western Australia and the rest of the country is bush fire (Bradstock, Williams, & Gill, 2002). Australians have to face bush fire issues every year. Exacerbated by development and fewer regular small intensity fires, the effect of fire on biodiversity has become a significant issue in Australia, a continent with unique flora and fauna (Bradstock et al., 2002). Rehabilitation of degraded, disturbed landscapes needs to be implemented by all stakeholders. Hence, restoration programs of native plant and animal species have been carried out in Western Australia in order to improve ecological integrity (Cristescu, Rhodes, Frere, & Banks, 2013; Koch, 2007).

To implement habitat restoration and relocation programs of native plant and animal species, it is important that government agencies and local communities discuss the process and plan to prepare the programs together (Robertson & McGee, 2003). Local communities can provide essential reference information to help determine the history and ecology of a specific area (Robertson & McGee, 2003). This information is needed to fill in the knowledge gap between the historical extent of native species and the current situation in order to prevent an inappropriate decision in introducing wrong types and amount of flora and fauna which can cause long-term negative impacts on ecosystems (Cristescu et al., 2013; Miller, Van Megen, & Buys, 2012). Therefore, local people, as stakeholders, should understand more about their local biodiversity in order to help manage biodiversity loss. A key mechanism for increasing knowledge of local people is through education of children.
Academic institutions and related organisations in Australia have been providing environmental education for local people, especially children, in order to increase their knowledge, awareness and engagement in environmental conservation (Ingram, 2008). There is evidence that residential environmental camps can help increase children’s knowledge and emotional affinity toward nature, as well as their willingness to display eco-friendly behaviours (Collado, Staats, & Corraliza, 2013; Wells & Lekies, 2006). Therefore, it is important to examine characteristics of residential camps in Australia as well as camp leaders’ perspectives in order to design more effective biodiversity and wildlife conservation programs.

1.2 Aims of the research

This research project aims to contribute to understanding about programmes that communicate biodiversity and wildlife conservation and the impact of those programmes on awareness and attitudes of children in a Western country (Australia) and a Southeast Asian country (Thailand). Ultimately, it aims to improve the communication of biodiversity and wildlife conservation in Thailand by determining the applicability of effective factors in a Western context (Australia) to the Thai situation, taking into account local knowledge and practices. This analysis has been used to develop a model for communicating biodiversity and wildlife conservation in Thailand. The research project was conducted in four parts with a focus on case studies of two programs; one provided by an organization in Australia and one in Thailand.

Perth Zoo camp

Perth Zoo is one of the leading zoos in Australia. It is located in South Perth, Western Australia. As a modern zoo, Perth Zoo is involved in both national and international biodiversity conservation actions. Science communication programs and activities that
contribute to biodiversity and wildlife conservation have been conducted at Perth Zoo for many years. Perth Zoo camp, established in 2007 and studied for this research in 2012 and 2013, has been one of Perth Zoo’s popular science communication programs for school children aged 9-13. Perth Zoo camp includes activities such as Race to Save, Enrichment and Night Walk, designed to increase children’s awareness and understanding of biodiversity and wildlife conservation and improve their attitudes to be more supportive of conservation. These activities are meant to give participants a better understanding of the role of modern zoos as well as provide information about animals and their habitat (Perth Zoo, 2014).

At the time of this study, Perth Zoo was the most popular excursion destination for Western Australia’s secondary science teachers (Bickford, Longnecker, & Venville, 2011). Due to Perth Zoo’s many years of experience in communicating biodiversity and wildlife conservation issues to children in Western Australia, Perth Zoo camp was an obvious choice as a case study for this project.

**Sakaerat Environmental Research Station**

The Sakaerat Environmental Research Station (SERS) was established by the Thai government in 1967 and administered by the Thailand Institute of Scientific and Technological Research (TISTR). It is located in a biosphere reserve in Nakhon Ratchasima Province which is about 300 kilometers northeast of Bangkok, the capital city of Thailand. In addition to SERS’ role in ecological and environmental research, the station has provided an annual biodiversity and wildlife conservation camp for school children aged 10-13 since 2002 (SERS, 2005).

The biodiversity and wildlife conservation camp at SERS is a free program lasting three days and two nights and run once a year by TISTR’s Knowledge Centre team. Children can
apply to attend the camp themselves. They are required to write an essay about how the camp would make a difference in their lives. Forty-five to fifty-five children are selected to attend the camp each year during April which is a school holiday in Thailand. At the camp, the children hear about biodiversity and wildlife conservation and enjoy immersive activities such as bird watching, stargazing, hiking, and interactive activities such as calico bag painting. Because of its many years of experience in biodiversity and wildlife conservation education and access via administrators of the camp, the SERS camp was also chosen as an appropriate case study.

1.3 Research design

The research paradigm for this social science research project was pragmatic in that it has a real-world orientation. The project is centred around out-of-school education about biodiversity and conservation in two countries which are both experiencing significant losses of biodiversity and where environmental education has a role to play, but which have significant cultural differences and therefore any approach in one programme may need to be modified before being applied in the other. The methodological approach for this research involved multiple case studies and used mixed methods for collection of both qualitative and quantitative data from multiple sources. Mixed methods were used to conduct this research (Creswell, 2008) because a mixed method approach helps in overcoming the inevitable shortcomings of any individual method and provides more varied approaches to gather and analyse data for the research (O’Leary, 2013). The research objectives were integrated into the research framework shown below. The thesis is divided into five components. The first component is the literature review. The second component comprised interviews with camp leaders. The third and fourth components involved case studies. The fifth component applied the lessons learned in the previous
components to develop a model for communicating biodiversity and wildlife conservation to Thai children.

As shown in the research framework (Figure 1.1), this study aims to achieve two objectives. The first is to "examine factors influencing the learning process in residential environmental education camps". This was addressed by examining related literature, perspectives and characteristics of environmental educators at Perth Zoo camp and SERS camp as well as the characteristics of both camps. The second objective is to "consider factors influencing environmental education in different cultural contexts". To address this objective, the findings about children's engagement and what children learned from both case study camps were considered from the perspective of the Thai researcher who was immersed in the western cultures of Australia and New Zealand during her PhD studies. After the two objectives were addressed, lessons learned were applied, and a model for communicating biodiversity and wildlife conservation for Thai children was developed. The five components conducted in this research were used as a process to achieve the research objectives.

**The first component: A literature review**

A literature review was undertaken on factors influencing children’s learning processes focused on environmental conservation. After exploring these factors, the investigation of factors influencing pro-environmental behavior was the next focus. The information from this component influenced the interviews, the case study research and the development of a model for communicating biodiversity and wildlife conservation for Thai children.

**The second component: Interviews**

Interviews were conducted to examine perspectives of camp educators at Perth Zoo camp and SERS camp as an efficient way to get in-depth information from respondents
Face to face interviews were conducted with camp educators by the researcher before the camps started. The interviews with SERS camp educators were conducted in Thai and transcribed and translated into English for analysis. As the researcher was enrolled at the University of Western Australia (UWA) while collecting data, interview questions used in this part were approved by the UWA Human Research Ethics Committee (RA/4/1/5126).

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<th>Examine factors influencing the environmental learning process</th>
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<tr>
<td>• Literature review</td>
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<tr>
<td>• Examine perspectives and characteristics of Australian and Thai environmental camp educators</td>
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<tr>
<td>• Examine characteristics of established biodiversity and wildlife conservation programs at Perth Zoo camp and SERS camp</td>
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<tr>
<td>• Examine children’s engagement with activities at the camps</td>
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<td>• Examine what children learned from the camps</td>
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<table>
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<tr>
<th>Consider factors influencing environmental education in different cultural contexts</th>
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<tr>
<td>• Compare observations from case studies at Perth Zoo camp and SERS camp and consider which aspects of a western education style might be effectively applied in Thailand</td>
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<tr>
<th>Apply lessons learned</th>
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<tbody>
<tr>
<td>Develop a model for communicating about biodiversity and wildlife conservation for Thai children</td>
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Figure 1.1 Framework outlining approaches taken to achieve objectives for the research described in this thesis, showing how the five thesis components (designated with superscripts) complemented each other.

The third component: Observations at Perth Zoo camp and surveys of participants

Science communication activities such as presentations, displays, games and guided walks conducted at Perth Zoo camp were observed and evaluated. The reason for using observations to gather data in this component is because they help capture the phenomena of activities and events (Walliman, 2010). As Perth Zoo camp did not have an
evaluation process, pre- and post- surveys and a mind map activity were used to obtain data from primary school students in school years 4 to 7 (9 to 13 years old) at Perth Zoo camp. Pre-and post-surveys included closed format questions. Questionnaires are commonly used to obtain opinions, attitudes and reactions of people (Walliman, 2010). Qualitative and quantitative data analyses were conducted in this part. The surveys used in the stage were approved by UWA Human Research Ethics Committee.

The fourth component: Observations at SERS camp and surveys of participants

Observations were made of science communication activities conducted at a science youth camp organised by the Thailand Institute of Scientific and Technological Research (TISTR), which takes place once a year at the SERS in Thailand. At this camp, the researcher’s intention was to not interfere in the camp environment so that effectiveness could be clearly observed. Survey questionnaires were given to participants (10 to 13 years old) by the TISTR camp coordinators who shared the data with the researcher one week after the camp ended. Qualitative and quantitative data analyses were conducted on the data.

The fifth component: A model for communicating biodiversity and wildlife conservation to Thai children

This component integrated understanding of the challenges and effectiveness of Australian and current Thai practices to develop a model for communicating biodiversity and wildlife conservation to children in Thailand. This component included critical analysis and model development, and considered the implementation of the model. Adaptations of some Australian activities are recommended to accommodate Thai practices and the local situation.
1.4 Thesis Structure

This thesis consists of six chapters. This chapter is a general introduction. The remaining five chapters describe the five components of this project. Chapter 2 is an overview of significant literature on children’s learning in environmental conservation and pro-environmental behaviours. Chapter 3 includes a review of the literature on the importance of environmental educators and presents results from interviews with environmental camp educators at both Perth Zoo camp and SERS camp. Chapter 4 presents a case study about an Australian environmental residential camp (Perth Zoo camp). The literature reviewed in that chapter focuses on the residential experience and environmental education as well as the role of zoos in environmental education. Chapter 5 presents a case study on characteristics of an environmental residential camp in Thailand (SERS camp). The literature reviewed in that chapter focuses on biodiversity and conservation issues in Thailand, the relevance of content to camp objectives, the important role of camp leaders in environmental education, and children’s engagement. Chapter 6 presents an integration of the lessons learned from the literature reviews, interviews and case studies, and describes a model for communicating biodiversity and wildlife conservation for Thai children. The implementation of the model, limitations of this study, and recommendations for further study are also discussed.
Chapter 2: Children, environmental conservation and pro-environmental behaviour

A better understanding of children’s learning in environmental conservation will allow us to create better ways to communicate with them about environmental problems (Paraskeva-Hadjichambi, Korfiatis, Hadjichambis, & Arianoutsou, 2012). A number of studies have focused on children’s attitudes, awareness and behaviour towards environmental issues (Dillon, 2013; Kahriman-Ozturk, Olgan, & Tuncer, 2012; Kos, Jerman, Anžlovar, & Torkar, 2016; Liefländer & Bogner, 2014). Liefländer & Bogner (2014) indicated that enhancing pro-environmental behaviour can be more effective with children at a younger age and it may become less effective and difficult when children get older. This supports the findings of Kos et al. (2016) who indicated that preschool children showed progress in understanding pro-environmental behaviour after they gained information about pro-environmental behaviour and actively participated in pro-environmental activities at home or school. Kos et al. (2016) also reported that if we have an appropriate way to communicate with preschool children about pro-environmental behaviour, they are able to understand the scientific background and how their behaviour influences the environment. This is supported by the study of Huang and Yore (2005) who also indicated that children at the age of 10 are able to distinguish environmental problems and their impact.

How to build on children’s pro-environmental behaviour is a challenge for environmental educators. Children, especially in urban areas, are becoming less likely to interact with nature (Clements, 2004; Freeman & Tranter, 2011; Cumbo, et. al, 2014; Soga & Gaston, 2016; Soga et al., 2016). Connecting children with many types of experiences in nature can help build their attachment to nature (Cumbo et al., 2014; Freeman & Tranter, 2011; Louv, 2008; Dillon et al., 2006). Direct environmental learning experiences from nature can help
children acquire a basic understanding of the environment and associated environmental issues (Dillon, 2013; Dillon et al., 2006; Wells & Lekies, 2006). Frequent positive experiences from many types of interactions with nature can also promote positive conservation attitudes and awareness (Collado, Staats, & Corraliza, 2013; Wilson, 1995). Having direct experience with nature can encourage children to be observant of their surroundings and may spark their curiosity about the complexity of our biodiversity (Campen, 2012; Freeman & Tranter, 2011; Louv, 2008; Chawla, 1998). Activities such as residential camps in nature and field visiting can have positive impacts on children’s attitudes and behaviours toward the environment (Wells & Lekies, 2006).

Scholars agree that direct experience in nature is a key factor for encouraging children to have positive attitudes toward nature and learn about environmental conservation. However, knowledge and positive attitudes about the environment on their own do not necessarily result in pro-environmental behaviour (Jensen, 2002; Kollmuss & Agyeman, 2002; Longnecker, 2016). Children are problem solvers and seek to solve problems presented to them using their own strategies (National Research Council, 2000). They also learn from watching, listening and experiencing. Adults need to help connect children with both new situations and familiar ones in order to help them develop their problem-solving skills (National Research Council, 2000). To help children understand about conservation and display pro-environmental behaviour, factors in environmental learning processes that lead to pro-environmental behaviour need to be addressed. These factors are introduced here and are discussed in more detail in Chapters 4, 5 and 6.

2.1 Theoretical frameworks of pro-environmental behaviour

Scholars in the field of environmental education and motivational research have provided evidence demonstrating many factors that impact on human learning in environmental conservation and pro-environmental behaviour (Chawla, 1999; Kollmuss & Agyeman,
Numerous theoretical frameworks have been developed to explain this issue. The model of pro-environmental behaviour from the early 1970s (Kollmus & Agyeman, 2002) in Figure 2.1 points out that knowledge can help trigger environmental awareness and lead to pro-environmental behaviour.

![Figure 2.1 Early model of pro-environmental behaviour reproduced from Kollmuss & Agyeman 2002.](image)

This framework has been elaborated upon by many studies as more factors have been identified which influence pro-environmental behaviour (Ando, Yorifuji, Ohnuma, Matthies, & Kanbara, 2015; Bronfman, Cisternas, López-Vázquez, Maza, & Oyanedel, 2015; Kollmuss & Agyeman, 2002; Sawitri, Hadiyanto, & Hadi, 2015; Stevenson et al., 2014). Frequent direct experience with nature during childhood was found to have an influence on pro-environmental attitudes (Collado et al., 2013; Hinds & Sparks, 2008). Collado et al. (2013) reported in their study that daily conversation at the summer camp in nature could increase emotional affinity toward nature in children. By increasing emotional affinity toward nature, children may create an emotional bond with nature that can lead to willingness to learn more about environmental conservation and display pro-environmental behaviour. They found that parents’ and camp leaders’ attitudes and values towards nature, social norms, moral norms or feelings of guilt are cofounding factors that have an influence on children's pro-environmental behaviour. This finding is in line with the Theory of Planned Behaviour (TPB) (Figure 2.2) and the Integrated Model of Science Communication (Figure 2.3)
A number of environmental education studies have begun to rely on the Theory of Planned Behaviour (TPB) as it helps predict and understand children's intentions to engage in various activities including environmental activities (Basri, Sukor, & Sabahiah,
In a recent study by De Leeuw et al. (2015), it was indicated that attitudes, subjective norms and perceived behaviour control have significant impact on high-school students’ intentions to engage in eco-friendly behaviours. They also note that the behaviour of family members, parents and celebrities can have a significant effect on student’s intentions to engage in eco-friendly behaviours. This finding is in line with Fielding et al. (2008) who indicated that attitudes and subjective norms showed significant positive predictors of environmental activities.

A different approach on using TPB to analyse pro-environmental behaviour in young people can help explain factors that cause children to act environmentally. Attitudes do not determine people’s behaviour directly, but they have an influence on people’s behavioural intentions as well as subjective norms (family members and friends); (Harré, 2011; Longnecker, 2016). However, subjective norms from family members and friends can also become barriers to pro-environmental behaviour. Understanding barriers to pro-environmental behaviour can help close the gap between environmental knowledge, environmental attitudes and pro-environmental behaviour (Kollmuss & Agyeman, 2002). Kollmuss and Agyeman (2002) explained that pro-environmental behaviour is a complex process because it involves both internal and external factors. Knowledge, feelings of fear, values and attitudes contribute as internal factors while infrastructure, politics, society, culture, and economic situations are counted as external factors (Kollmuss & Agyeman, 2002).

Kollmuss and Agyeman (2002) defined knowledge on the impact of human behaviour towards the environment as “environmental awareness” which consists of cognitive and affective components. They also pointed out that environmental awareness and pro-environmental behaviour are shaped by personality traits, internal factors and external
factors. Moreover, the environmental knowledge, values, attitudes and emotions of an individual contribute to pro-environmental consciousness, which play an important role in shaping our pro-environmental behaviour. Longnecker (2016) elaborated on this by emphasising the central role of self-perceived identity in shaping behaviour. Other possible barriers to pro-environmental behaviour include a lack of knowledge, existing values that prevent learning, existing knowledge that contradicts environmental values, existing values that prevent emotional involvement, emotional blocking of new knowledge, emotional blocking of environmental values and attitudes, a lack of environmental concern, a lack of internal incentives, a lack of external possibilities and incentives, a negative or insufficient feedback about behaviour, and old behaviour patterns. Kollmuss and Agyeman (2002) developed a possible model to explain how barriers function in pro-environmental behaviour processes. Their model was influenced by many studies from related fields including TPB. The illustration of Kollmuss and Agyeman’s model of pro-environmental behaviour is displayed in Figure 2.4.

![Figure 2.4 Model of pro-environmental behaviour (Kollmuss & Agyeman, 2002).](image)
From the model, the red boxes indicate barriers to pro-environmental behaviour. Kollmuss and Agyeman (2002) and Harré (2011) conclude that existing behaviour patterns are strong barriers to pro-environmental behaviour. In order to encourage children to display pro-environmental behaviour, we need to consider what influences behaviour patterns in children.

2.2 Factors influencing children’s behaviour patterns towards nature

In social learning theory, behaviours can be learned by observing others (Bandura, 1977). Many scholars in environmental education have found that children’s behaviours towards nature are influence by parents and family members (Ando et al., 2015; Collins, 2015; Gotschi, Vogel, Lindenthal, & Larcher, 2009; Grønhøj & Thøgersen, 2009). As parents are primary facilitators, it can be assumed that children acquire values, skills and behaviour patterns from them (Ando et al., 2015). Parents may encourage children to act in environmentally friendly ways through verbal communication, but instead children usually learn from their observations without reinforcement (Rogoff, Paradise, Arauz, Correa-Chavez, & Angelillo, 2003). Parental behaviours can be perceived as subjective norms (Ajzen, 1991, 2005) which has significant influence on children’s environmental behaviours (Grønhøj & Thøgersen, 2012). Demonstrating pro-environmental behaviour such as re-use and recycling, using environmental friendly products, using public transport and reducing energy consumption in households can help shape children’s values, attitudes, and behavioural patterns toward nature (Freeman & Quigg, 2009; Grønhøj & Thøgersen, 2009).

In addition to parental behaviours, behaviour patterns can be informed by other social norms and cultural values (Soyez, 2012). Soyez (2012) conducted a study with 1,096 consumers in United States of America, Canada, Germany, Australia and Russia in order to investigate the effect of culture on the impact of pro-environmental values and
behaviours. The study revealed that the influence of pro-environmental value orientations were different according to national cultural values. By using TPB to test the influence of pro-environmental value orientations, Soyez’s study confirmed that TPB could be used as a conceptual framework for predicting organic food consumption cross-culturally. People in these three countries want to protect nature (rather than feel they have to protect nature). People in Germany and Russia are more likely to associate pro-environmental behaviour with survival values. They felt that they have to protect the nature in order to secure natural resources, so as to survive. This study confirmed that social and cultural values have an influence on an individual’s pro-environmental behaviour patterns.

Social norms are also useful for fostering pro-environmental behaviour patterns in the tourism and hospitality industries (Terrier & Marfaing, 2015). Terrier and Marfaing (2015) conducted an experiment with hotel guests from 110 rooms in a four-star hotel in Switzerland to reuse bath towels in an effort to conserve natural resources. They found that the normative messages and commitment strategy led to a decrease in the number of towels replaced.

Parental influences, cultural values and social norms are referred to as subjective norms in TPB. The approaches to investigate the impact of these factors on people’s behaviours shed light on factors that may also influence children’s existing behaviour patterns. Even though direct experience in nature is important for children learning about environmental conservation, the process to foster children’s pro-environmental behaviour is not easy as it involves many factors. To develop a model for encouraging biodiversity and wildlife conservation among children in Thailand, all of these factors need to be considered.
Chapter 3: Camp educators’ perspectives on residential environmental education programs in Australia and Thailand

3.1 Abstract

Interviews of camp educators were conducted to examine their perspectives about residential environmental education programs. Twelve educators participated in this study. Six were camp educators at Perth Zoo Camp in Perth, Australia. The other six were camp educators at an environmental residential camp in Sakaerat Environmental Research Station (SERS), in a northeastern region of Thailand. The same set of interview questions was asked and results were analysed using meaning condensation and categorical coding techniques.

Most interviewees had a background in science. The camp educators from Perth Zoo camp had past experience related to animals while the camp educators from SERS had past experiences working with children and environmental research. All of the camp educators at Perth Zoo camp had similar perceptions of their program’s core ideas. Their expectations about what children should learn from the camp aligned with core program ideas. However, the camp educators at SERS had mixed understandings of their program’s core ideas and variable expectations about what children should learn from the camp.

Perth Zoo camp educators described their challenges as working with mixed gender and age groups, leading the camp in a non-classroom style. They emphasised the importance of being enthusiastic and passionate about what they do. Most SERS camp educators reported that employing appropriate evaluation and encouraging children to think or solve problems is challenging. Almost all of the camp educators from both camps suggested that that an effective program should have interactive and enjoyable activities that encourage children to think and feel engaged.
3.2 Introduction

Importance of camp educators

Environmental education programs have a long history and have been practiced in many countries including Australia (Linke, 1980). The practices of environmental education as it has developed have focused on the study of nature and outdoor education for years (McRae, 1990). Environmental education programs consist of various activities concerning conservation and the interrelationship between humans and nature (Linke, 1980; McRae, 1990). Many environmental education programs have been established as part of school curricula to promote student understanding of the impact of human activities on the environment (Lotz-Sisitka, Fien & Kethoilwe, 2013). Many programs are developed for pre-school and primary school levels. Aims include developing students' observational skills and providing students opportunities to experience, discover, and explore the relationship between humans and nature (Lundholm, Hopwood & Rickinson, 2013). In this regard, it is crucial that educators are prepared to provide and lead worthwhile activities for students.

To provide and lead environmental education activities can be a challenge (McRae, 1990; Stern et al., 2013; Thomas, 2005). Educators need to have a certain set of skills and a clear understanding of the content, objectives of the program, and core program ideas in order to implement a program effectively (Ramsaroop & Van Rooyen, 2013). Program providers should recognise that educators play an important role in implementing environmental learning activities (Le Roux & Maila, 2004). However, little consideration has been given to their environmental science literacy backgrounds, characteristics, expectations, viewpoints, perceptions of the objectives or core ideas of the program. Instead, many environmental education programs focus on improving participants' attitudes and increasing their knowledge and pro-environmental behaviour (Kuhar, Bettinger,
Lehnhardt, Tracy, & Cox, 2010). To achieve meaningful outcomes and strengthen environmental education programs, environmental educators need to be equipped with knowledge and professional experience (Jacobson & Robles, 1992). They need to be committed to the work and trained to develop critical thinking skills to help them deal with challenges of leading the activities (Ferreira, Keliher, & Blomfield, 2013). Before conducting training, program providers need to understand environmental educators’ characteristics, expectations, and viewpoints. Through an in-depth understanding of related information, program providers can identify what areas they need to improve and initiate appropriate professional training programs that enhance environmental educators performances and result in meaningful outcomes for their environmental education programs.

This study investigates and compares Australian and Thai camp educators’ characteristics, expectations, and viewpoints. Results of this study have been used for constructive changes to both Australian and existing Thai environmental education programs and will be used to develop a camp educator training program in Thailand.

3.3 Research aims

This chapter of the thesis aims to:

1) Describe characteristics of camp educators in Australia and Thailand.

2) Examine camp educators’ perspectives about the core program ideas.

3) Determine expectations of the camp educators about children’s learning outcomes at the camp.

4) Explore the camp educators' views of the programs.
3.4 Methods

The method used in this chapter was in-depth interview. Interviews allow researchers to understand people’s points of view and explore the meaning of people’s experiences (Brinkmann & Kvale, 2015). Interviews can be carried out in various locations such as workplaces or research sites. Interviewees should be asked for their preference of interview locations to ensure their physical and psychological comfort (King & Horrocks, 2010). To avoid psychological discomfort, King & Horrocks (2010) suggest that interviewers should avoid sitting facing interviewees over a table because interviewees can associate it with a formal and stressful job interview. King & Horrocks (2010) recommend sitting around the corner of a table because it makes interviews feel less formal.

Before carrying out an interview, a researcher must develop interview questions based on research questions. Thematic and academic wordings in research questions need to be revised into uncomplicated and straightforward questions that promote smooth conversation (Brinkmann & Kvale, 2015). According to Brinkmann & Kvale (2015), one research question can be examined by using various interview questions and, likewise, one interview question can answer several research questions. Brinkmann & Kvale (2015) suggest that interview questions should be brief and simple. Questions that begin with ‘why’ and ‘what’ should be asked before ‘how’ question so that interviewees can provide more explanation in their answers. Some suggestions for types of interview questions from the literature are: demographic questions, experience questions, opinion questions, feeling questions, knowledge questions, and sensory questions (King & Horrocks, 2010; Patton, 1990). All the interview questions used in this study were based on these types. In accordance with the literature reviews, eleven simple and straightforward interview questions were developed from the research questions (Table 3.1).
Table 3.1 Interview questions developed from research questions.

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Interview questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Descriptive characteristics of camp educators in Australia and Thailand</td>
<td>- How old are you?</td>
</tr>
<tr>
<td></td>
<td>- What is your highest qualification?</td>
</tr>
<tr>
<td></td>
<td>- How long have you been working with Perth Zoo/Sakaerat Camp?</td>
</tr>
<tr>
<td></td>
<td>- What made you want to work as a Perth Zoo/Sakaerat camp educator?</td>
</tr>
<tr>
<td></td>
<td>- Have you had past experiences involved in working with animals?</td>
</tr>
<tr>
<td>2. What are the camp educators’ perspectives about the core program ideas?</td>
<td>- What are the core program ideas of the camp?</td>
</tr>
<tr>
<td>3. What are expectations of the camp educators about children’s learning?</td>
<td>- What do you think students get out of the camp?</td>
</tr>
<tr>
<td>4. What are camp educators’ views of the programs?</td>
<td>- What is your favourite thing about the camp?</td>
</tr>
<tr>
<td></td>
<td>- What is the best age for students to come to the camp?</td>
</tr>
<tr>
<td></td>
<td>- What are the challenges for running the camp?</td>
</tr>
<tr>
<td></td>
<td>- Do you have any suggestions for setting up an effective camp?</td>
</tr>
</tbody>
</table>

3.4.1 Participant demographics

All camp educators (12 people) from Australia and Thailand consented to participate in this study. The six Australian participants all had jobs involved with environmental education and worked as educators at Perth Zoo camp. All of them were female. Three of them were aged between 22 and 26 years old and three were aged between 55 and 58.

The six Thai participants also worked as camp educators for a residential camp, at the Sakaerat Environmental Research Station (SERS) in Thailand. There were three female participants between 28 and 34 years old and three male participants between 32 and 56 years old.
3.4.2 Data collection

Face to face interviews were conducted by the researcher in English (Australia) or in Thai (Thailand). All interviews were conducted at the camp educators’ workplaces. The wording and structure were simplified after two pilot tests at the camps.

All the interviews ranged from 20 to 30 minutes in duration. Audio recordings of the interviews were made with consent of all participants.

3.5 Data analysis

All of the interview data from Perth Zoo camp educators were transcribed by the researcher and were reexamined by a native English speaker for validation. For the interviews conducted in Thai with camp educators at SERS, transcriptions were also done and translated into English by the researcher. For the validation of the translation, a back-translation method was used to ensure that meaning was conveyed. Back-translation is a process of validation in which the original language is translated into a target language and then translated back into the original language again in order to check inconsistencies, mistranslations, and meanings (McGorry, 2000). The back-translation process in this study was done by a bilingual person. Examples of the back-translation are shown in Appendix 1.

Analysis of interviews condensed meaning by categorising information based on the transcripts (Kvale, 2015). Ten topics were condensed from the interview questions (Table 3.2).
Table 3.2 Meaning condensation of the interview questions.

<table>
<thead>
<tr>
<th>Interview questions</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How long have you been working with Perth Zoo/SERS camp?</td>
<td>- Work as camp educator</td>
</tr>
<tr>
<td>2. What is your highest qualification?</td>
<td>- Background in related sciences</td>
</tr>
<tr>
<td>3. What made you want to work as a Perth Zoo/SERS camp educator?</td>
<td>- Passion</td>
</tr>
<tr>
<td>4. Have you had past experiences involved in working with animals?</td>
<td>- Past experience</td>
</tr>
<tr>
<td>5. What are the core program ideas of the camp?</td>
<td>- Core program ideas</td>
</tr>
<tr>
<td>6. What do you think students get out of the camp?</td>
<td>- Expectation of children’s learning</td>
</tr>
<tr>
<td>7. What is your favourite thing about the camp?</td>
<td>- Favourite activities at the camp</td>
</tr>
<tr>
<td>8. What is the best age for students to come to the camp?</td>
<td>- Best age for the camp</td>
</tr>
<tr>
<td>9. What are the challenges for running the camp?</td>
<td>- Challenges</td>
</tr>
<tr>
<td>10. Do you have any suggestions for setting up an effective camp?</td>
<td>- Suggestions for setting up an effective camp</td>
</tr>
</tbody>
</table>

The answers to interview questions were compressed into a central theme using the same technique. Compressing answers into a central theme was more complicated than condensing meaning from the interview questions because the answers from participants were complex. All the answers were read carefully to get a sense of the answers and to determine their natural meaning in the context of the interview questions. The answers were then compressed into central themes using shorter statements in which the precise meanings were retained (Kvale, 2015). Examples of the analysis are shown in Table 3.3.
Table 3.3 Meaning condensation for interview answers.

<table>
<thead>
<tr>
<th>Central theme</th>
<th>Examples of answer from the participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passion</td>
<td>&quot;I wanted to work at the zoo since I started uni with wildlife and conservation. I like teaching kids a lot and I knew a couple of people that did zoo camps. They really enjoyed it so I sort of asked around and got information from them. What they actually do. And I love doing the lesson. I like speaking to kids and telling them about conservation. I also work with primates at the zoo. I love doing that sort of job. I like looking after animals. I like teaching people as well. The most rewarding part of it is when you get a good school coming through that is very enthusiastic about wildlife-makes it easier to speak to them. That makes me want to do it&quot;. - (Perth Zoo camp educator 1)</td>
</tr>
</tbody>
</table>

| Expectation of children's learning | "We want them to enjoy living with nature, seeing all kinds of animals so that they know that their world is actually bigger and is not just about tall buildings, high technology and expensive entertainment. This will allow them to better appreciate wildlife". - (SERS camp educator 2) |

| Suggestions for setting up an effective camp | "The most important thing is having a schedule. A certain time that things are happening. Like 7 O'clock going to the education room, be able to talk about the lesson, and then 8 O'clock you do the enrichment and, then you have supper and do the night stalk. I think having a schedule of what's happening and when things are happening is an important aspect of the zoo camp [and] make it run smoothly". - (Perth Zoo camp educator 2) |

After the meaning condensation process was complete and had been validated by discussion with other science communication researchers, all the answers were generated in rows and columns of a matrix format. A matrix format was used to present the data for easy viewing in one place, which helped in further cross-case analysis (Miles, 2014). The cross-case analysis was appropriate to use in this research because it helps in comparing common trends, meaning and relationships of the data in order to draw meaningful conclusions (Miles, 2014). Table 3.4 shows the interview analysis of six Perth Zoo camp educators in a matrix format.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
<th>Educator 1 (Age 22)</th>
<th>Educator 2 (Age 23)</th>
<th>Educator 3 (Age 26)</th>
<th>Educator 4 (Age 55)</th>
<th>Educator 5 (Age 58)</th>
<th>Educator 6 (Age 58)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work as camp educator</td>
<td>- 3 year</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- 2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- 1 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Background in related sciences</td>
<td>- Yes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Passion</td>
<td>- Animals and conservation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Talking to people/working with people</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Past experience</td>
<td>- Related to animals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Core program ideas</td>
<td>- Conservation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Habitat</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Enrichment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Expectation of children's learning</td>
<td>- Awareness of conservation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Enrichment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- New experiences/perspectives</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- How the zoo take care of animals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Different type of animals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Favourite activities at the camp</td>
<td>- Night stalk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Making enrichment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Giving lessons</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Best age for the camp</td>
<td>- Year 3-8 (8-14 years old)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Year 5-6 (10-11 years old)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Year 4-7 (9-13 years old)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Challenges</td>
<td>- Leading camp</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Working with children</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Activities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Suggestions for setting up an effective camp</td>
<td>- Regarding activities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Regarding careful schedule</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Regarding children's experience and learning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>- Regarding camp educators</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
</tbody>
</table>
The interview data from all the Perth Zoo camp educators were condensed into ten topics. Table 3.4 shows the central themes of the camp educators’ answers and how many of them provided answers related to those themes.

Table 3.5 shows the interview analysis data of six camp educators from SERS in the same matrix format for comparison with the Perth Zoo camp educators. The same set of topics was used to analyse their answers.

3.6 Results

The interview analysis revealed characteristics of the camp educators. All the camp educators in the Australian case study were female, while four out of six of the camp leaders in the Thailand case study were male. The age ranges of the camp leaders were between twenty and early thirties or early fifties to late fifties in both countries.

Perth Zoo Camp educators

Characteristics of Perth Zoo camp educators revealed by analysis of the interview data is shown in Figure 3.1.

Overall, only half of the camp educators at Perth Zoo had a background in related sciences (conservation, zoology, and science communication) but all of them had past experiences related to animals. They were all passionate about animal conservation and almost all of them were passionate about talking/working with people. Two of them had worked for three years at the camp, two had two years experience, and two had one year of experience.
Table 3.5 Analysis of SERS camp educators.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
<th>Educator 1 (F, Age 34)</th>
<th>Educator 2 (F, Age 28)</th>
<th>Educator 3 (M, Age 28)</th>
<th>Educator 4 (M, Age 49)</th>
<th>Educator 5 (M, Age 32)</th>
<th>Educator 6 (M, Age 56)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work as camp educator</td>
<td>- 10 years</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- 9 years</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- 7 years</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- 5 years</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td>Background in related sciences</td>
<td>- Yes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Passion</td>
<td>- Animals and the environment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>- Educating children about the environment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td>Past experience</td>
<td>- Related to the environment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>- Related to children’s education</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>2</td>
</tr>
<tr>
<td>Core program ideas</td>
<td>- Conservation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>- Value of biodiversity</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Positive attitude toward science</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Knowledge on forests and wildlife</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Awareness of the environment</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Different experiences from living in a city</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Coexisting with nature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- First hand experience with animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td>Expectation of children’s learning</td>
<td>- Awareness of conservation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>- Appreciation of nature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Coexistence with nature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- New experiences being in nature</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Different type of animals and plants</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Science is not difficult</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td>Favourite activities at the camp</td>
<td>- Hiking</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Stargazing and bug trapping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td>Best age for the camp</td>
<td>- Year 5-7 (10-13 years old)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
</tr>
<tr>
<td>Challenges</td>
<td>- Working with children</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Employing better evaluation</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Leading camp</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Activities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
</tr>
<tr>
<td>Suggestions for setting up an effective camp</td>
<td>- Regarding activities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>- Regarding content</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Regarding children’s experience and learning</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Regarding camp educators</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
</tr>
</tbody>
</table>
Figure 3.1 Characteristics of Perth Zoo camp educators.

Figure 3.2 shows expectations, viewpoints, and how the Perth Zoo camp educators perceived the core ideas of their program. According to Figure 3.2, all of the Perth Zoo camp educators perceived conservation as a main core program idea for the camp. However, three of them added that animal habitat was also a core program idea for the camp, while the other two mentioned enrichment as one of the core program ideas. As a result of perceiving conservation as a core program idea, they all expected children to develop greater awareness of conservation. Half of them also articulated an expectation that children learn about enrichment and have new experiences at the camp. Less than half hoped for children to gain knowledge about different type of animals and how the zoo takes care of animals. Perth Zoo camp educators have different opinions about their favourite activities. The majority of them said that they enjoyed leading the night stalk the most, while two enjoyed enrichment and one giving lessons. Half of the camp educators agreed that children years 4 to 7 (9 to 13 years old) were the most suitable for the camp, while a few educators suggested that children years 5 to 6 (10 to 11 years old) were more
suitable. One camp educator felt that the camp was suitable to a broad age range of children (years 3 to 8; 8 to 14 years old).

The majority of the camp educators claimed that leading camp poses the biggest challenge because it requires passion and the educators have to avoid acting like a school teacher. One added that it was challenging to work with children of mixed ages and genders. Another mentioned that activities during which the camp educators were not in charge were challenging because she could not control or talk to the children about what they learned.

*I would say trying not to act like a teacher was a challenge. Because some of the schools come in and the kids are not well behaved and you find that you are disciplining them more than teaching them about wildlife which is not worth it. That's why we always have the teachers come, and they should be in charge of their kids' behaviors and then you are the one teaching them about conservation. I find that is really important because kids are always excited when they come to the zoo camp. They always get silly and they are really noisy. That sort of thing.*

- Perth Zoo camp educator 1

*I think finding staff for the zoo camp is a challenge. It is really important to find someone who is really passionate about what they are doing and passionate about conservation, and passionate about kids, and willing to spend time and talk about the things that they can do to help save the environment. I think it is really challenging.*

- Perth Zoo camp educator 2

Perth Zoo camp educators provided suggestions for an effective camp. Most of the camp educators placed value on keeping all the activities fun and interactive as well as making the children feel that they can make a difference. One of them focused on children’s experiences and learning by often discussing with children and always provided conclusions after each activity regarding the purpose of the activity and what the children should learn from it. Another suggested that the camp should focus on a careful schedule.
Figure 3.2 Expectation, viewpoints, and suggestions of Perth Zoo camp educators.
Staff should be those who are enthusiastic, who are knowledgeable as well as understanding and open-minded and be able to get along with children as well. - Perth Zoo camp educator 1

You need to keep it fun. If it is too serious, they are not interested. You need to keep it fun by educating them but in a fun way so they don't realise that it is an actual lesson. And keep something that they can look forward to. Some hands-on type of work like the enrichment that the kids make for the animals and give to the animals the next morning. Keep something that they can look forward to all the time...something different. - Perth Zoo camp educator 4

I think we have to give them a sense that they can make a difference. They might think that they are just one person and "What am I gonna do? I am not gonna make any difference, am I?" But if one person does it, and then another person does it, and another person and another person, then, at the end you've got thousands of people and you do make a difference. So that is a good thing to get across. I think that is the valuable aspect for the kids and they feel good about themselves. - Perth Zoo camp educator 6.

SERS camp educators

Characteristics of SERS camp educators revealed by analysis of the interview data is shown in Figure 3.3.

The matrix shows that all of the SERS camp educators had backgrounds in related sciences (agricultural extension and communication, fisheries, geography, and biology). Most of them had past experiences related to environmental work and two of them had past experience related to educating children about the environment. Most of them were passionate about animals and the environment as well as educating children about the environment. As a result of their background and passion, three of them had worked at the camp for ten years and the rest had worked between five and nine years.
Figure 3.3 Characteristics of SERS camp educators.
Figure 3.4 illustrates that the majority of SERS camp leaders perceived conservation as a core program idea of the camp. However, there were many other core program ideas put forward that differed between individuals — the value of biodiversity, a positive attitude toward science, knowledge of forests and wildlife, awareness of the environment, the difference in experience from living in a city, coexistence with nature, and first hand experiences with animals. Expectations about what the children would learn also differed between the camp educators. Half of them agreed that the camp would teach children to appreciate nature. Two of them thought that the children would learn to coexist with nature while two others felt that the children would increase their awareness of conservation. Two other camp educators expected that the children would gain a new experience of being in nature. Knowledge of different types of animals and plants was expected by one educator and a change of attitude about the difficulty of science was expected by yet another. All of the camp educators agreed that their camp is most suitable for children in years 5 to 7 (10 to 13 years old). Three of the camp educators mentioned that Hiking was their favorite camp activity while the other three favoured Stargazing and Bug Trapping.
Figure 3.4 Expectations and viewpoints of SERS camp educators.
Figure 3.5 shows the challenges and suggestions reported by SERS camp educators. Perspectives on challenges differed between the individuals. Two of them mentioned that working with the children was challenging because most of the children were afraid to ask questions and lack assertiveness and self-confidence. As a result, it took time to build up the children's confidence. Another two camp educators thought that employing a better evaluation for the camp was challenging. One camp leader added that leading the camp while avoiding giving information in a classroom style was challenging while another said that incorporating an idea into an activity was challenging.

- SERS camp educator 1

\[
I \text{ personally think that it is challenge to work with children. As we know, most Thai parents are overprotective of their kids which makes it hard to work with the kids because they expected us to help them learn, just like when their parents were helping them do their homework at home. Most of the kids lack self-confidence and assertiveness and are afraid to ask questions. Plus, Thai students tend to have a short concentration span. So, the activities chosen have to be dynamic and entertaining so that they can have fun learning.} \]

\[\text{- SERS camp educator 4}\]

The camp educators made suggestions for an effective camp regarding activities, content, children's experiences and learning, and the camp educators themselves. Almost all of them agreed that the activities should be fun, interactive, and dynamic. They should consume less time and resources. Useful activities from similar programs in Western countries should be considered for integration into the camp. One of them said that the content of the camp should support what the children learn at schools while another thought that the camp should focus on the children's experiences and knowledge, especially on the importance of biodiversity. Another one added that the camp educators should lead the camp in a fun and enjoyable way.
I think we have to see what resources are available to us and choose activities that encourage students to play active roles rather than merely concentrate on lectures. The camp leader must be able to make education enjoyable and productive. They have to be well trained in order to facilitate all kinds activities so that the students are impressed and will able to assimilate concepts effectively. - SERS camp educator 6

I would suggest conducting fun and dynamic activities. I once saw a Western program on television where student volunteers who joined the program were actually helping animals with different kinds of problems like injury and disability. I think we can incorporate many useful techniques from a similar program like that. But whether we can achieve the same result is quite another story. It has been a tradition in Thailand that students learn by memorizing things instead of really understanding them. So, they cannot be as decisive as the Western students. So we might need to have some sort of a pilot program with staff offering constant guidance just to let them grow accustomed to the new techniques, and once they get the hang of it, the staff can take one step back at a time and finally watch them do things themselves. - SERS camp educator 5

3.7 Discussion

Nine out of twelve camp educators had backgrounds in related sciences. All of the Perth Zoo camp educators had past experiences related to animals. Four of the SERS camp educators had past experiences related to environmental work and the other two had past experiences in educating children. This finding is important because environmental educators need to have professional experience and knowledge of the subject (Jacobson & Robles, 1992).

The results suggested that Perth Zoo camp educators perceived the core program ideas similarly and their expectations were aligned with the core program ideas as shown in Table 3.6.
Figure 3.5 Challenges and suggestions from SERS camp educators.
Table 3.6 Alignment between the core program ideas as perceived by Perth Zoo camp educators and their expectations of what children would learn.

<table>
<thead>
<tr>
<th>Core program ideas</th>
<th>Expectation of children's learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td>- Awareness of conservation</td>
</tr>
<tr>
<td></td>
<td>- New experiences/ perspectives</td>
</tr>
<tr>
<td>Habitat</td>
<td>- Different types of animals live in different habitats</td>
</tr>
<tr>
<td></td>
<td>- New experience/ perspective</td>
</tr>
<tr>
<td>Enrichment</td>
<td>- Enrichment</td>
</tr>
<tr>
<td></td>
<td>- How the zoo takes care of animals</td>
</tr>
<tr>
<td></td>
<td>- New experiences/ perspectives</td>
</tr>
</tbody>
</table>

The data revealed that different SERS camp educators perceived the core program ideas in different ways which resulted in greater variety in expectations of what the children would learn. The alignment between the core program ideas and the expectations at SERS camp is shown in Table 3.7.

Table 3.7 Alignment between the core program ideas as perceived by SERS camp educators and their expectations of what children would learn.

<table>
<thead>
<tr>
<th>Core program idea</th>
<th>Expectation of children's learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td>- Awareness of conservation</td>
</tr>
<tr>
<td>Value of biodiversity</td>
<td>- Different types of animals and plants</td>
</tr>
<tr>
<td>Knowledge on forests and wildlife</td>
<td>- Different types of animals and plants</td>
</tr>
<tr>
<td>Awareness of environment</td>
<td>- Appreciation of nature</td>
</tr>
<tr>
<td>Different experiences from living in city</td>
<td>- New experiences being in nature</td>
</tr>
<tr>
<td>Coexisting with nature</td>
<td>- Coexisting with nature</td>
</tr>
<tr>
<td>First hand experience with animals</td>
<td>- Appreciation of nature</td>
</tr>
</tbody>
</table>

Tables 3.6 and 3.7 demonstrated the camp educators in the two camps had different understandings of core program ideas. Ramsaroop & Van Rooyen (2013) noted that educators need to have a clear understanding of program objectives and program core ideas in order to implement a program effectively.

Reflecting on their challenges, camp leaders found that leading the camp, working with children, and conducting the activities were still challenging for them no matter how long
they had been working for the camps. This is consistent with the study of Ferreira, Keliher, & Blomfield (2013) who suggest professional training to enhance environmental educators' critical thinking skills which will help them overcome challenges. However, one challenge was added by the camp educators from Thailand. Two SERS camp educators mentioned better evaluation for their camp as a challenge, saying better methods of evaluation were needed to replace the questionnaires. Collectively, these findings indicate that professional training programs would be useful at both camps but particularly for the SERS camp where there was great variety in camp educators' perception of core program ideas.

Unsurprisingly the camp educators' suggestions for running a camp reflect the challenges they found at their camps. Suggestions were made with regard to activities (enjoyable, interactive, and encouraging children to think), children's experience and learning (learning through experiences to appreciate nature and themselves), and camp educators (well-trained, get along with children, fun, and enthusiastic) by the majority of the camp leaders from both countries. However, one SERS camp educator mentioned that the content at the camp should also support what the children learn at schools. These suggestions by the camp educators could be useful for program providers to initiate constructive improvement for their camps as they are the reflections of years of professional experience.

3.8 Conclusion

This study provided an overview of educators at the Perth Zoo camp and SERS camp which helps understand their similarities and differences, problems, and perspectives. Research in the area of camp educators’ characteristics, problems, and diverse perspectives is useful as they contribute to success in environmental education. By exploring more deeply environmental educators' roles and viewpoints, we can obtain broad perspectives of
individuals, not only to help in initiating more meaningful training programs, but also to encourage more people to participate in this field (Evans, Ching, & Ballard, 2012). Hence, paying more attention to the perspectives and environmental science literacy of environmental educators may help create more concrete knowledge for children (Almeida, 2015). Thus, the perceived behavioural control of children could be affected by camp educator's perspectives and their environmental science literacy.

The data gained from interviews did not examine the camp educators’ performances or the outcomes of their performances. This part of research was conducted in order to learn more about camp educators' characteristics, problems, diverse perspectives and environmental science literacy background. Further investigations into the camps' characteristics, contents, the engagement of camp educators with children, and what children actually learned from the camps were conducted (Chapter 4 and 5) in order to determine strengths and weaknesses of both camps and to inform development of a model for communicating biodiversity and wildlife conservation in Thailand (Chapter 6).
Chapter 4: Characteristics of an Australian environmental residential camp  
(a case study of Perth Zoo Camp)

4.1 Abstract

Most modern zoos promote environmental education and wildlife conservation to increase awareness of environmental threats and biodiversity loss. School children attending an overnight Perth Zoo Camp conducted by the Perth Zoo Education Program heard messages about wildlife conservation. To examine the Perth Zoo Camp, mixed methods were used to collect data from 233 students from four primary schools in Australia who attended a camp. Analysis was comprised of thematic analysis of qualitative data and statistical analysis using SPSS. After attending the camp, there was a significant increase in the number of students who agreed that their lifestyles have an impact on wildlife conservation. Furthermore, there was a significant increase in the number of students who agreed that they know more about how to help wildlife.

The students reported that they learned about conservation and particular animals at the camp. The data collected from mind maps illustrated that students remembered types of animals, types of habitat, and animal behaviour. They also demonstrated positive attitudes towards animals and an awareness that many animals are in need of help. Approximately 25% of the students mentioned the relationship between biodiversity and animals.

Statistical analysis revealed that girls were more excited about going to the camp than boys. The level of student engagement reflected the camp educators' delivery, and the two were positively correlated.
4.2 Introduction

Residential experience and environmental education

Residential experience is a good source of personal learning and allows for the acquisition of new knowledge and information about the environment (Zoldosova & Prokop, 2006). It has been recognized for decades that personal experience helps us learn faster and remember and appreciate information longer (Sharp, 1948). Most people, especially students, can remember a direct personal experience – such as fieldwork, field trips, or outdoor visits – for many years (Falk & Dierking, 1997). These activities can provide experiences which impact long-term learning (Pace & Tesi, 2004).

Examples of residential experience can be found in environmental education (Adkins & Simmons, 2002). Environmental education can be defined as a process that aims to improve knowledge about the environment and awareness of its associated problems as well as to motivate people to solve environmental problems (Stapp et al., 1969). Environmental education also exists in other forms. It can occur formally in classrooms or informally in excursions and residential programs (Dettmann-Easler & Pease, 1999). Environmental education programs can be an effective strategy for environmental learning if they help school children gain a better understanding of how to engage in environmentally friendly behaviours (Makki, Abd-El-Khalick, & BouJaoude, 2003). Environmental education programs can provide out-of-classroom learning experiences as well as help school children become aware of and develop positive attitudes towards environmentally friendly actions (Ballantyne, Anderson, & Packer, 2010). Environmental education outside the classroom also plays an important role in developing children’s appreciation of nature (North, 2010). Knowledge about environmental issues as well as positive attitudes and values toward the environment in school children can also be created by effective environmental education programs (Birdsall, 2010). Birdsall (2010)
showed that 11 to 12 year old students in New Zealand gained more knowledge and had more positive attitudes about wildlife and environmental conservation after participating in environmental education programs. After participating in a program about lake water quality, the students were able to make useful suggestions for sustainable development plans related to the ecosystem of the lake, effects of pollution, effects of erosion and water quality testing. In Dunedin, New Zealand and Ensenada, Mexico, school-based environmental education programs were reported to promote positive environmental attitudes and children's involvement in environmental activities (Aguirre-Bielschowsky, Freeman, & Vass, 2012). Aguirre-Bielschowsky et al., (2012) also reported that children who enjoyed environmental activities at schools also often practice the activities at home which helps spread environmental practices in their families and communities. Such results demonstrate the potential effectiveness of well-designed environmental education programs.

**Role of zoos in environmental education**

Modern zoos are undoubtedly popular places for both adults and children. More than 600 million people visit zoos every year worldwide (Packer & Ballantyne, 2010; Wagoner & Jensen, 2010). Zoos are not only a place for recreation and leisure but are a primary place where people of all ages can engage with animals and environmental education (Wagoner & Jensen, 2010). For many years, zoos have continued to improve in management, networked breeding programs, and public education about conservation (Whitehead, 1995). In the twenty-first century, many zoos focus on education, conservation, and promoting environmental education and wildlife conservation in order to reduce the accelerated rate of environmental degradation and biodiversity loss (World Association of Zoos Aquariaums, 2005).
To fulfill the role of promoting environmental education and wildlife conservation, many zoos have education teams and trained volunteers to help provide education activities and conservation messages for both general visitors and school groups (Packer & Ballantyne, 2010). Effectively trained volunteers and enthusiastic zoo education teams are likely to contribute to desirable and long lasting memories for visitors (Whitehead, 1995). Furthermore, visitors’ knowledge and attitudes toward wildlife and conservation can be influenced by zoo representatives (Smith, Broad, & Weiler, 2008). Smith et al. (2008) found that many visitors who listened to a Bird of Prey interpretive presentation from trained staff at Healesville Sanctuary Zoo reported improved recycling habits and were able to recall information about helping birds of prey and their habitats during follow-up phone interviews five to six months later. Research conducted on children visiting London Zoo also revealed a significant increase in the children’s understanding of animals and their habitats after listening to a presentation delivered by zoo educators (Wagoner & Jensen, 2010). These results confirm the value of zoo representatives and the potential of environmental education based at zoos.

**4.3 Research questions**

As Perth Zoo was the most popular excursion destination for Western Australia’s secondary science teachers at the time this study was initiated, (Bickford, Longnecker, & Venville, 2011), it was chosen as an appropriate case study to document the characteristics of an established environmental residential camp and to answer the following questions:

1) What is the content relevance of different activities at Perth Zoo camp and their alignment to the core program ideas?

2) What are characteristics of camp educators' delivery and children’s engagement in different activities at Perth Zoo camp?
3) Do these characteristics correlate with children’s attitudes about the environment?

4) What do children learn after attending Perth Zoo camp?

### 4.4 Methods

This research project was an exploratory case study undertaken using mixed-methods. The overnight camp at Perth Zoo was selected for a collective case study. A collective case study is a method in which more than one class is studied (Cousin, 2005; Stake, 1995). Mixed-methods are often used in social science research (Abowitz & Toole, 2009). Both qualitative and quantitative methods were used to investigate broader dimensions of the camp and link them together to enhance the findings of the researcher (Morse & Cheek, 2014). In this case study, observations and mind maps were used to gather qualitative data from all participating students; surveys were administered to obtain quantitative data. This research was approved by the University of Western Australia’s Human Research Ethics Committee (RA/4/1/5126).

#### 4.4.1 Case study description

Perth Zoo camp is an overnight camp at the metropolitan zoo in Perth, Australia, organized from September to March each year. It provides an excursion program for school groups of students from year 4 to year 8. The camp starts at 5 pm and runs overnight to 9 am the following day. The students have the opportunity to explore the zoo at night on a guided spotlight tour (Night Stalk) and spend the night in Perth Zoo’s Homestead Barn. The core program ideas of the overnight camp are to provide knowledge of wildlife conservation, discuss the roles of modern zoos, and explain the importance of enrichment for animals kept in captivity. The children learn through the activities
provided. Participating children have an opportunity to create enrichment items that are given to the animals before they leave the camp.

In the case of Perth Zoo camp, the purpose was to document activities of the residential camp in general and determine which characteristics of those activities contributed to, or lessened impact of, the camp. With approval from Perth Zoo’s Research Committee and the UWA Human Research Ethics Committee, information sheets and consent forms were sent to schools packaged with Perth Zoo Camp material. Four schools (233 students at eight camps) and six zoo camp educators (see Chapter 2) agreed to participate in this study.

4.4.2 Participant demographics

All of the participants were Australian citizens who lived in Western Australia. They were all English speakers.

Camp educators

The camp educators who participated in this study can be classified into two groups. The younger group ranged between 22-30 and the older group ranged between 55-58. All of them were female. All of the camp educators in the younger group were studying at university. They all had related sciences backgrounds and were passionate about animals and conservation. The older group all had high school qualifications. None of them had a background in science but all were passionate about animals. Each camp was led by two camp educators.

Students

There were 233 students from four different schools in Western Australia. Fifty-seven percent of the students were girls and forty-three percent were boys. The students were aged between nine and thirteen years old, from school year or grade 4 to year 7 (Figure
A group of students from one school attended a camp. Each group had around 25-33 students.

![Pie chart showing school year distribution among students]

**Figure 4.1 Students’ school year.**

### 4.4.3 Data collection

**Observations**

Observation is a method that has been used in child development research since the early 1900s (Jersild & Meigs, 1939). At the time of Jersild & Meigs’s (1939) report, direct observation had already been used to investigate many aspects of young children’s behavior for years. It has been widely applied in both controlled and uncontrolled situations to record children’s behaviour, learning, and patterns of their activities in specific circumstances (Piaget, 1969). Nowadays, observation is a complex research method which requires an observer to take part in certain roles and use their five senses as well as number of techniques to gather data (Baker, 2006). Different researchers will have different ways to implement their own observations to suit their study and level of involvement (Kawulich, 2005). In many cases (including this study), interviews and questionnaires may be used to supplement the observations (Bazeley, 2013). Structured
observation, semi-structured observation, and unstructured observation are techniques that can be used in the observation process (O’Leary, 2013).

In this exploratory case study, semi-structured observation was used. Passive participation observation was used to preserve the natural setting of the camp. In passive participation observation, all of the activities are observed on site without participation from the observer (Spradley, 1980).

Before conducting observations, a pilot observation protocol key was developed (Bazeley, 2013; Creswell, 2008; Richards, 2009). The pilot observation protocol was tested at Perth Zoo camp. Elements of the observation and its criteria were adjusted to be more practical after the pilot test and discussion with experienced science communication researchers from the University of Western Australia (UWA). For example, the description of each score was rewritten to cover all possible situations. The first element of the observation was the relevance of content in each activity provided. Content relevance was scored from 1 to 5, with 1 being poor and 5 being excellent. Criteria for content relevance scores are provided in Table 4.1.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>No core program ideas were mentioned at all during the camp activity.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>The core program ideas were effectively addressed in less than half of the camp activity.</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>The core program ideas were adequately addressed in at least half of the camp activity.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>The core program ideas were conveyed throughout most of the camp activity.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>The core program ideas were clearly and consistently expressed during all or nearly all of the camp activity.</td>
</tr>
</tbody>
</table>
The second element of the observations involved camp educators’ delivery. Criteria for scoring camp educators’ delivery were developed and adjusted using results from the pilot test. Each camp educator's delivery was scored from 1 to 5, with 1 being poor and 5 being excellent. Criteria of camp educators’ delivery are provided in Table 4.2.

Table 4.2 Criteria used to score camp educators' delivery during each activity at the Perth Zoo camp.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>Camp educator appeared unprepared or without enough knowledge to communicate or run the camp activity.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>Camp educator appeared partially prepared, had some knowledge to communicate or run the camp activities and paid attention to the needs of the students.</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>Camp educator appeared prepared, paid adequate attention to students and expressed some correct knowledge but could present more effectively.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>Camp educator appears prepared, was attentive to the students and presented the camp activities effectively but not necessarily both.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>Camp educator appeared prepared, enthusiastic, and highly attentive to the students, presented the camp activities effectively and accurately and communicated the core program ideas.</td>
</tr>
</tbody>
</table>

The third element of the observations was scoring students' engagement during each activity at the Perth Zoo camp. The maximum number of students for one camp was 33 and the minimum number was 25. Students' engagement was scored from 1 to 5, with 1 being poor and 5 being excellent. Criteria of students' engagement are provided in Table 4.3.
### Table 4.3 Criteria used to score students' engagement during each activity at the Perth Zoo camp.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>At least half of the students were off task and doing things irrelevant to the camp activity.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>More than half of the students were showing interest in the camp activity, but many were distracted by the environment (friends, animals and surroundings).</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>Most of the students were paying attention to the camp activity but not actively participating.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>Most of the students were paying attention to the camp activity and some were actively participating.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>All or almost all of the students were actively participating and appeared enthusiastic about the camp activity.</td>
</tr>
</tbody>
</table>

### Surveys

Pre- and post-activity questionnaires are common tools for social science research to gather primary data from participants (Groves, 2013). Pre- and post-activity questionnaires have been used for many years in environmental education research to assess children’s knowledge as well as to evaluate program impact (Ajiboye & Olatundun, 2010; Armstrong & Impara, 1991; Cetin & Nisanci, 2010; Padua & Jacobson, 1993; Strickland, Robertson, Jettinghoff, & Diener, 1984). Questionnaires for young people need to be simple in structure (Bell, 2007). According to Bell (2007), good questionnaires for children are clear, simple, short, and straightforward. She also suggested that negative formulated questions should be avoided because they cause confusion for children and lead to a negative response. Moreover, an appropriate number of response options is important in designing questionnaires for children. A higher number of response options results in lower response rates because some children are not able to recognise the difference between the options (Borgers & Hox, 2000; Hox & Borgers, 2001). Furthermore, completely-labeled scales should be used in questionnaires for children.
because they are easier for children to interpret than numeric ones (Bell, 2007; Borgers & Hox, 2000).

In this study, questionnaires were developed with reference to the literature but there was one question written in a negative form as consistent responses provided confidence that the children read the questionnaires carefully. There were ten simple statements with completely-labeled scales (Appendix 2). The questionnaires aimed to learn about the children’s enthusiasm about the camp and the children’s attitudes toward wildlife conservation.

The pre-activity questionnaires were distributed to children at Perth Zoo before the camp started. The post-activity questionnaires were distributed as the camp finished and collected before the students left Perth Zoo.

**Mind maps**

Constructing a mind map is a structured note-taking technique that enhances people’s learning and thought processes (Brinkmann, 2003). Mind maps use flexible hierarchical structures to present ideas or concepts in words or pictures that relate to a main key word or key idea (Wheeldon, 2011). Mind maps were developed in 1970 by Tony Buzan, a psychologist and brain researcher, and the term was a registered trademark of the Buzan Organization (Buzan & Buzan, 1993; Mento, Martinelli, & Jones, 1999). Mind maps are used in many education research projects because they provide valuable information about people’s ideas and retention of information (Budd, 2004; Karatekin, 2013; Mento et al., 1999; Noonan, 2012; Wheeldon, 2011; Willis & Miertschin, 2006). Mind maps were found to be a reliable method to evaluate Turkish elementary student’s perceptions of environmental problems (Karatekin, 2013). They have also been used to determine depth of students’ knowledge of sustainability and pro-environmental behaviours (Salter, 2013;
Salter, Venville, & Longnecker, 2011) and students’ perceptions about cultural knowledge and scientific knowledge (Gondwe & Longnecker, 2015).

In this study, students’ mind maps were used to help identify what students learned from the camp. At the end of the camp, each student was given a coloured pencil and an A3 size piece of paper with the words Biodiversity and Wildlife on it (Figure 4.2).

![Figure 4.2 An example of a mind map created by a student at Perth Zoo camp.](image)

The mind maps were used to capture each student’s thoughts about biodiversity and wildlife after the camp. Students were asked to draw links between these two domains if they thought any of the words they added were connected to both. Although most of the students were familiar with mind maps, they were briefly instructed in how to create the mind maps. As time was limited, the students had only ten minutes to create their mind maps.
4.5 Data analysis

4.5.1 Observation analysis

Data gathered from observations were divided into qualitative and quantitative data for analysis. Qualitative observations were recorded by taking notes. The quantitative data were the scores in four categories: content coverage in each activity, camp educator delivery, and student engagement. Trends were used to identify the directions in which particular categories seem to be moving (Krippendorff, 2012). For example, the trend of student engagement was higher when the camp educators had a high score for delivery. The camp atmosphere also tended to be more lively when the camp educators had a higher score for delivery.

Quantitative data were recorded using the observation protocol key (Table 4.1, 4.2 and 4.3). Data were examined with non-parametric analyses using Statistical Package for the Social Sciences (SPSS). Spearman’s rank correlation coefficient (Spearman’s rho) was used to determine the correlation between camp educator delivery and student engagement as well as the correlation between content relevance and student engagement.

4.5.2 Survey analysis

Statistical analysis of quantitative data gathered from the surveys was conducted using SPSS. All of the data were dependent data. Descriptive statistics were used to determine frequencies of the scores. A Shapiro–Wilk test was performed to determine if the data set had a normal distribution. The result from the normality tests was 0.000. As this is less than 0.05, the null hypothesis was rejected, suggesting that the data were not normally distributed.

Non-parametric techniques were used to analyse the data in this survey because the measurement scales were ordinal and nominal and so did not meet the assumptions of
parametric techniques (Pallant, 2013; Sheskin, 2003). A Mann-Whitney U Test was used to test the correlation between gender and excitement about coming to the camp. Wilcoxon signed-rank test was used for analysis of changes of student knowledge and attitudes before and after the camp.

Thematic coding was used to analyse students’ responses to the open-ended questions. The coding manual was developed and adjusted after a validation trial with other science communication researchers at the University of Western Australia. The themes were revised from eight to seven themes to reduce confusion caused by an overlap of two meanings. By using the revised version of the coding manual, the intercoder agreement improved from 71% to 87%.

4.5.3 Mind map analysis

Mind maps were analyzed using thematic coding. A thematic coding manual was developed after carefully reading and rereading the data. Nine categories of data appeared from the mind maps and were categorized into different themes. A coding manual was developed according to the themes and was discussed with other science communication researchers. A trial run using the coding manual was conducted with them and a revision to the category descriptions was made according to their suggestions (Table 4.4). Intercoder agreement was improved from 70% to 78% after the revision.

The links between biodiversity and wildlife were also counted to evaluate student awareness of connections between the two words.
### Table 4.4 Mind map coding manual.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description of category</th>
<th>Examples under wildlife</th>
<th>Examples under biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of animal</strong></td>
<td>Types of animal and animals names including the drawings of animals.</td>
<td>- Elephant</td>
<td>- Tiger</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reptiles</td>
<td>- Frog</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Nocturnal</td>
<td>- Different species</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>Forest, tree, bush, sand, ground, river, ocean, sky and other places where animals live</td>
<td>- Trees</td>
<td>- Rain forest</td>
</tr>
<tr>
<td></td>
<td>including drawings of those mentioned.</td>
<td>- Ponds</td>
<td>- Rocky land</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Savannah</td>
<td>- Wetland</td>
</tr>
<tr>
<td><strong>Conservation</strong></td>
<td>Concepts, themes of conservation, and action, including description and drawings</td>
<td>- I want to save all species.</td>
<td>- Watering plants</td>
</tr>
<tr>
<td></td>
<td>of conservation or exploitation behaviours or ideas.</td>
<td>- Animal extinction</td>
<td>- Endangered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Poached</td>
<td>- Chopped down</td>
</tr>
<tr>
<td><strong>Enrichment</strong></td>
<td>Enrichment items that the students learned from the zoo or have for their pets at</td>
<td>- Rope</td>
<td>- Food</td>
</tr>
<tr>
<td></td>
<td>home.</td>
<td>- Food</td>
<td></td>
</tr>
<tr>
<td><strong>Zoo/Wildlife sanctuary</strong></td>
<td>The word zoo or picture and the concept of a zoo or wildlife sanctuary.</td>
<td>- Zoo</td>
<td>- The zoo’s biodiversity is huge.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No cages</td>
<td>- Medical care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Shelter</td>
<td></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>Student’s perception of the meaning of wildlife or biodiversity.</td>
<td>- Wildlife is when animals are around.</td>
<td>- Man and animals living in the same</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Animals that live in the wild that are not</td>
<td>habitat.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in zoos.</td>
<td>- Animal and plants live in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I think its animal what live in the</td>
<td>the place.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>jungle.</td>
<td>- Where the animals fit together.</td>
</tr>
<tr>
<td><strong>Animal behaviour</strong></td>
<td>Mating, breeding, or the food chain including drawings of those mentioned.</td>
<td>- Breeding</td>
<td>- Mating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pictures of food chain</td>
<td>- Communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Leave sick and hurt behind</td>
<td>- Cuddle</td>
</tr>
<tr>
<td><strong>The students’ attitudes</strong></td>
<td>Refers to student’s expression of wildlife and biodiversity.</td>
<td>- Cute</td>
<td>- I did research on this.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Nice to learn something about wildlife.</td>
<td>- Interesting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Like to learn</td>
<td>- Nice environment</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Things that do not fit in any of the above categories or are unclear.</td>
<td>- Unclear handwriting</td>
<td>- Unclear handwriting</td>
</tr>
</tbody>
</table>


4.6 Results

4.6.1 Observations

Seven activities were provided at the camp (Table 4.5). They are discussed in the following section. The first five activities (Introduction, Race to Save, Habitat Real Estate, Enrichment, and Night Stalk) ran from 5 pm until 10 pm. The last two activities (Habitat Hop and Giving Enrichment) were run the next morning from 7:30 am until 9 am.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (minutes)</th>
<th>Content relevance</th>
<th>Camp educators’ delivery</th>
<th>Students’ engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity 1: Introduction</td>
<td>15</td>
<td>5.0</td>
<td>4.38</td>
<td>4.50</td>
</tr>
<tr>
<td>Activity 2: Race to Save</td>
<td>40</td>
<td>4.0</td>
<td>N/A</td>
<td>3.12</td>
</tr>
<tr>
<td>Activity 3: Habitat Real Estate</td>
<td>35</td>
<td>5.0</td>
<td>4.06</td>
<td>4.06</td>
</tr>
<tr>
<td>Activity 4: Enrichment</td>
<td>40</td>
<td>5.0</td>
<td>3.75</td>
<td>3.75</td>
</tr>
<tr>
<td>Activity 5: Night Stalk</td>
<td>45</td>
<td>5.0</td>
<td>3.75</td>
<td>3.37</td>
</tr>
<tr>
<td>Day 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity 6: Habitat Hop</td>
<td>35</td>
<td>3.0</td>
<td>3.69</td>
<td>3.63</td>
</tr>
<tr>
<td>Activity 7: Giving Enrichment</td>
<td>45</td>
<td>5.0</td>
<td>2.81</td>
<td>2.69</td>
</tr>
</tbody>
</table>

Activity 1: Introduction

At the beginning of each camp, students were told about the rules and regulations of the camp during the Introduction activity. All the camp educators made sure that the students understood about the rules and regulations by asking them questions about what the students had been told. Examples of the questions were: "What do you do when you get
lost from your group?” “Can you run around the zoo?” and “What do you do during the Night Stalk?” The students demonstrated that they remembered and understood the rules and regulations of the camp by giving the correct answers to the camp educators. This activity went on for about 15 minutes and all of the students appeared enthusiastic.

**Activity 2: Race to save**

Race to Save was the next activity. Race to Save was designed so that students could explore the zoo. The students were divided into small groups (five to six students in each group). Each group was accompanied by a teacher or carer. The camp educators did not lead this activity. Camp educators gave each group different laminated cards that had the first clue for specific animals. When the groups got the right answer, the next clue would be found at those specific animal exhibits. Animals that needed to be found were the Tasmanian devil, elephant, painted dog, tiger, cassowary, lemur and alligator. The majority of the students were enthusiastic about finding the animals. A few of them were enjoying the surroundings and wanted to take photos or see other animals instead of participating in the activity (Figure 4.3). This activity ran for about 45 minutes. The students had their dinner at a meeting point after this activity ended.

**Activity 3: Habitat Real Estate**

Habitat Real Estate ran after dinner. Students were taken into a small room where the zoo kept some small reptiles and were divided into small groups (3-4 people). Each group was given laminated cards that had pictures of animals, habitats, and some clues (Figure 4.4). Each group needed to match animals and habitats using the provided clues. After allowing some time (around 7 minutes) for the students to match up the animals and the habitats, camp educators asked all the groups how they thought the animals and the habitats should be matched up and gave the correct answer with some explanation afterward. The
The majority of students actively participated in the activity by sharing stories about animals that live in their own backyards. However, in one school group, a teacher scolded the students for being noisy, resulting in those students not actively participating.

At the end of this activity, camp educators took one of the animals (a bobtail or other blue tongue lizard) out of the exhibits and allowed the students to touch the animal one by one. The students were informed that they should only touch the lizards with two fingers. They were also reminded not to touch or pick up lizards in the wild. All of the students were enthusiastic to touch the lizard. This activity ran 30 to 40 minutes and most of the camp educators were engaged when leading the activity. Camp educators who have a background in related sciences discussed more details with the students about the prey and predators of some animals in the room and on the cards.

Figure 4.3 A student was enjoying watching at animals during the Race to Save activity.
Activity 4: Enrichment

Enrichment was an activity designed for students to learn about natural animal behaviours and zoo management. The activity was divided into two parts. The first part introduced the students to the concept of enrichment. The camp educators put ten items on the floor and asked the students to guess which items could be used as enrichment and for which type of animals (Figure 4.5). Most of the camp educators were enthusiastic in leading this activity. The majority of students actively participated by asking questions and sharing their own experiences having enrichment for their pets at home. However, a teacher from one school (the same teacher who scolded in Activity 3) scolded the students by telling them that they were only allowed to ask questions and not to share
their own stories which reduced active participation by the students and eroded the lively atmosphere.

Figure 4.5 A camp educator explaining about enrichment.

The second part of the activity was to make enrichment for animals (Figure 4.6). The enrichments made in this activity were fruit kebabs for cockatoos, popcorn bags for primates, or droppings sacks for cheetahs. Each camp made one type of enrichment depending on the zoo schedule. While almost all of the students were enthusiastic in making enrichments, a few of them only watched their friends. The majority of the camp educators were well-prepared. But in one case, an educator appeared to be unprepared and left in the middle of the activity to find some materials; the students stopped engaging in the activity. It is worth noting that camp educators who had a background in related sciences appeared to have more confidence discussing details about animal behaviours and food with students while they were guiding students in the creation of enrichments. This whole activity took 30 to 40 minutes.
Activity 5: Night Stalk

Night Stalk was the last activity of the first day. It was a highlight of the camp because the students had the opportunity to explore the zoo at night, an experience that is not otherwise available to the public. Before the activity began, the students were divided into two groups. Each group was led by one camp educator. Teachers and carers helped the leaders look after students during the activity. All of the students appeared excited and enthusiastic to see the animals. All of the camp educators gave a brief explanation of why they used red light torches instead of normal torches. However, only half of the camp educators demonstrated high engagement in their tasks by telling the students more about unique behaviours of individual animals in the zoo; this increased the students’ engagement even when they did not see the actual animals. Moreover, the camp educators who had background in related sciences also discussed why some animals are endangered with the students.
During this activity, if the students could not see a lot of animals, about half of them stopped engaging with the activity and started talking to each other. The teachers had to tell them to keep their voices down. However, there were four to five students in each camp who demonstrated active engagement by asking many question about animals, especially elephants, such as the difference between the skin of Asian elephant and African elephant. This activity provided an opportunity for children to share their own knowledge and experience. For example, one child shared her personal experience in Africa where her backyard was surrounded by painted dogs. This activity ran around 40 to 45 minutes.

**Activity 6: Habitat Hop**

Habitat Hop was the first activity on the second day and started after breakfast. It was a game for the students to play while the zoo keepers prepared an animal exhibition for the students in which they gave the enrichment items they had made to the animals. To play Habitat Hop, the students were divided into two groups and had to pretend that they were animals and needed to find a safe pathway back to their habitat which was on the other side (Figure 4.7). They were to remember the right pathway from the previous person and hop into the same pathway to the habitat. If they failed to follow the right pathway, they had to start over again on the next round. The camp educators gave the students a nod if they followed the right pathway and shook their heads if they hopped into the wrong pathway. The game ended when all the students crossed to their habitat safely.

Most of the students enjoyed the activity and actively participated. They were trying to guide their friends hopping into the right pathway. Two of the camp educators were particularly attentive to the students when delivering the activity. They demonstrated a good rapport with the students by laughing, smiling, and saying something funny instead
of just shaking their heads for the no sign. For example, “Oh no! You have been eaten by a lion. Go back and start over in the next round.” This increased a lively atmosphere during the activity, in contrast to one camp educator who led the activity without apparent enthusiasm.

![Figure 4.7 Students playing Habitat Hop.](image)

**Activity 7: Giving Enrichment**

Giving Enrichment was the last activity of the camp. Cheetahs, primates, and cockatoos were scheduled for enrichment during the case study. Each camp gave the enrichments they made to one type of animal. If the students were scheduled to give enrichments to primates or cockatoos, they were allowed to go quietly into the enclosure in a small group of five to six children. The zookeepers gave a talk about the animals and answered questions concerning the animals. However, not many students asked questions. The
camp educators were waiting outside and some of them encouraged student engagement by asking the students to talk about how they felt and what they learned inside the enclosure. However, some of the camp educators did not take the opportunity to consolidate learning from the activity and left the students off task (Figure 4.8).

Figure 4.8 Some students were off task during Giving Enrichment activity.

Quantitative Data

Quantitative data from the observation scores indicated a correlation between the camp educators’ delivery and the students’ engagement. The relationship between the observation scores from the camp educators’ delivery and the students’ engagement was investigated using Spearman’s rho. The value of the correlation coefficient (Cohen’s r) suggests that 0 indicates no relationship and 1 indicates a perfect relationship (Cohen, 2013). This result shows a strong, positive relationship between camp educators’ delivery and the students’ engagement (Table 4.6).
The relationship between content relevance and student engagement was also investigated using Spearman’s rho but no significance was found.

As for the open-ended survey questions, the students reported that they learned most about Conservation followed by Animals. Details and examples of their responses are shown in Table 4.7.

4.6.2. Surveys

A Mann-Whitney U Test was performed to determine the relationship between the students’ gender and their excitement about coming to the camp. The test revealed a significant difference in the excitement levels of boys (Mean Rank = 107.50, n =101) and girls (Mean Rank 124.27, n =132; Table 4.8). This significance would be considered a small effect size (r) using Cohen (2013) criteria of 0.1 = small effect, 0.3 medium effect, 0.5 = large effect. This suggests that girls were possibly a little more excited about going to the camp than boys.

### Table 4.6 Statistical correlation between observation scores of camp educator delivery and student engagement.

<table>
<thead>
<tr>
<th>Spearman's rho</th>
<th>Correlation Coefficient</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Camp educator delivery</td>
<td>Student</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spearman's rho</td>
<td>1.000</td>
<td>.940**</td>
<td>96</td>
<td>3.74</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>96</td>
<td>3.67</td>
</tr>
<tr>
<td>N</td>
<td>96</td>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.74</td>
<td>3.67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 4.7 Number of students' answers in each theme in response to survey question; "What is the most important thing you have learned at Perth Zoo camp? (N= 219)."

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
<th>Number of students who mentioned the theme</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Conservation awareness | Students mentioned recycling or to not destroy animal habitats or environment including the intention to conserve/help wildlife. | 102                                        | - That people are so cruel to animals, they kill them just for clothes.  
- That animals have a life too and we are chopping down their homes.  
- To recycle old mobile phone to help the environment.                |
| Animal                 | Students mentioned information about animals including the animal names, animal behaviour, and animal status. | 69                                         | - Know that painted dogs can help each other.                           
- I have learnt that meerkats aren't actual cats.                       
- That Tasmanian devils died from face tumour.                          |
| Behaviour              | Students mentioned how they should behave during their stay at the camp.     | 12                                         | - Don’t talk at night so you can see more animals.                      
- I have learnt that if you be quiet then you will hear all the animals.  
- Always stay together.                                                 |
| Enrichment             | Students mentioned how to keep animals healthy or what the enrichment is.    | 11                                         | - Animal enrichment.                                                    
- That all animals big or small need enrichment to keep them active, fit, healthy.  
- That animals are entertained with their toys.                          |
| Role of modern zoo     | Students mentioned the role of the modern zoo or how zoos help wildlife.     | 9                                          | - That zoos are not cruel as I thought because they take good care of the animals.  
- I have learned that we need zoos or else all animals will die.       
- The people at the zoo are helping the wildlife breed.                 |
| Friendship             | Students mentioned their experiences with their friends at the camp including teamwork. | 3                                          | - Have fun at the zoo with your friends.                                 
- That was to work as a team.                                           
- To work as a team.                                                    |
| Others                 | Students mentioned some other thing that could not be categorized into the six themes. | 12                                         | - To have fun.                                                          
- That sleeping on the camp beds are very annoying and uncomfortable.  
- How the zoo things fight and now the zoo is fun.                      |
Table 4.8 Statistical correlation between gender and level of excitement about going to the camp.

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Mean Rank</th>
<th>U</th>
<th>z</th>
<th>p</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am excited about going to Perth zoo Camp.</td>
<td>Boy 107.50</td>
<td>5706.500</td>
<td>-2.355</td>
<td>.019*</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td>Girl 124.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant level = p<.05

A Wilcoxon signed-rank test was performed to test for differences in answers to the pre- and post-surveys (Table 4.9). The test revealed a significant increase in agreement with statement number 2 (My life has an impact on wildlife conservation), with a small effect size (r=.017). There was also a small increase in agreement with statement number 4 (I know a lot of things I can do to help wildlife).

After the camp ended, the students were more likely to agree that their lives have an impact on wildlife conservation (Figure 4.9). Most of this shift could be accounted for by a decrease in the number of students who were unsure.

In contrast, the significant increase in the percentages of students who agreed with statement number 4 (Figure 4.10) could be accounted for by a decrease in the percentage of student who disagreed and strongly disagreed. However, the percentage of students who were unsure slightly increased after the camp.

These significant changes between the pre- and post-camp surveys suggested that students rethought their answers based on what they had learned at the camp.
Table 4.9 Students’ answers to statements on surveys administered before (Pre) and after (Post) the Perth Zoo camp (N=233).

<table>
<thead>
<tr>
<th></th>
<th>1: Wildlife conservation is important to me.</th>
<th>2: My life has an impact on wildlife conservation.</th>
<th>3: I want to help protect wildlife.</th>
<th>4: I know a lot of things I can do to help wildlife.</th>
<th>5: It is not my responsibility to fix up problems with wildlife conservation.</th>
<th>6: Adults listen to my opinions.</th>
<th>7: I want to learn more about wildlife conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank (Pre)</td>
<td>51.74</td>
<td>50.11</td>
<td>31.77</td>
<td>57.53</td>
<td>59.71</td>
<td>48.84</td>
<td>37.94</td>
</tr>
<tr>
<td>Mean Rank (Post)</td>
<td>60.34</td>
<td>60.02</td>
<td>36.66</td>
<td>51.53</td>
<td>57.55</td>
<td>44.76</td>
<td>40.09</td>
</tr>
<tr>
<td>Z</td>
<td>-.656</td>
<td>-2.598</td>
<td>-1.460</td>
<td>-1.980</td>
<td>-.974</td>
<td>-1.196</td>
<td>-.119</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.512</td>
<td>.009*</td>
<td>.144</td>
<td>.048*</td>
<td>.330</td>
<td>.232</td>
<td>.906</td>
</tr>
</tbody>
</table>

* Significant level = p<.05
4.6.3 Mind maps

Analysis of the mind maps revealed that students reported learning eight things under the two topics from the camp (Table 4.10). Students most often mentioned types of animals and second most often types of habitats. Mind maps were created by 202 students out of the 233 who participated.
Table 4.10 The results analysis of mind maps created by 202 students at the Perth Zoo camp.

<table>
<thead>
<tr>
<th>Category</th>
<th>Wildlife (Branches)</th>
<th>Wildlife (%)</th>
<th>Biodiversity (Branches)</th>
<th>Biodiversity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of animal</td>
<td>843</td>
<td>65.0</td>
<td>259</td>
<td>51.0</td>
</tr>
<tr>
<td>Habitat</td>
<td>265</td>
<td>20.0</td>
<td>113</td>
<td>22.0</td>
</tr>
<tr>
<td>Animal behaviour</td>
<td>62</td>
<td>4.75</td>
<td>50</td>
<td>10.0</td>
</tr>
<tr>
<td>The students’ attitudes</td>
<td>43</td>
<td>3.29</td>
<td>17</td>
<td>3.0</td>
</tr>
<tr>
<td>Conservation</td>
<td>28</td>
<td>2.14</td>
<td>17</td>
<td>3.0</td>
</tr>
<tr>
<td>Definition</td>
<td>23</td>
<td>1.76</td>
<td>27</td>
<td>5.0</td>
</tr>
<tr>
<td>Zoo/Wildlife sanctuary</td>
<td>14</td>
<td>1.00</td>
<td>13</td>
<td>3.0</td>
</tr>
<tr>
<td>Enrichment</td>
<td>4</td>
<td>0.30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
<td>1.76</td>
<td>15</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Animals that students mentioned the most were tiger ($n=72$), lion ($n=69$), and elephant ($n=54$). A Word Cloud was used to generate names of all animals mentioned on the students’ mind maps (Figure 4.11). The larger words in the Word Cloud were more frequently mentioned in the mind maps.

![Word Cloud](image)

Figure 4.11 Types of animal in the students' mind maps generated by Word Cloud.
Among habitat related words, the student mentioned trees \((n=71)\) the most, followed by plants \((n = 62)\) and bush \((n =30)\). The Word Cloud in Figure 4.12 shows all the habitat related words from the students’ mind maps.

![Word Cloud](image.png)

Figure 4.12 Habitat related words from the student mind maps generated by Word Cloud.

Only 25% of the students drew a link between wildlife and biodiversity.

### 4.7 Discussion

The observations made in this study revealed that the Perth Zoo camp was lively, energetic, and promoted a social atmosphere. Most of the students showed strong engagement in those activities where camp educators received high scores in delivery. Furthermore, the students connected their past experiences with what they learned at the camp by sharing their past experiences with nature or animals, including pets. The students referred to their existing experiences to help them understand new information at the camp. This finding is congruent with findings from early studies on experience and education which suggested that the existing experiences of learners are the foundation on which learners build their new knowledge (Dewey, 1963) and help learners to process reflective thinking (Quay, 2013). It can be said that existing experiences are a part of
students’ thought process as they correlate new knowledge with their experiences in order to define new knowledge.

As with positive results about children's engagement, the pre- and post-camp tests revealed significant changes in students' knowledge and attitudes. After the camp, students were more aware that their lives have an impact on wildlife conservation and they reported knowing more about what they can do to help wildlife. Because the camp was run over only one night, large changes in knowledge and attitudes were not expected. The significant changes show students were reconsidering answers, based on what they learned during the camp.

Mind maps illustrated that the most commonly remembered things students reported learning were related to conservation and animals. Students reported learning most about types of animals, types of habitats, and animal behaviour. They also demonstrated a positive attitude toward wildlife and an awareness that animals are in need of help. These findings verify that the students are exposed to the core program ideas that the camp educators and the Perth Zoo wanted to communicate at the camp. These results are consistent with others studies regarding the positive impact of residential environmental education programs on attitude, awareness, and knowledge (Collado, Staats, & Corraliza, 2013; Kruse & Card, 2004; Stern, Powell, & Ardoín, 2008; Wagoner & Jensen, 2010).

The surveys revealed that girls were more excited to come to the camp than boys. This is not surprising because females have reported a stronger concern with environmental issues than males (Bord & O’Connor, 1997; Tuncer, Ertepinar, Tekkaya, & Sungur, 2005; Zelezny, Chua, & Aldrich, 2000). The social nature of an overnight camp may also have had greater appeal to the girls.
The correlation between camp educators’ delivery and student engagement needs to be pointed out and taken into account when planning future camps. There was a strong, positive relationship between camp educator delivery and student engagement. In most of the activities the students were more enthusiastic and more actively participated in the activities when they were led by camp educators who received high scores for their delivery. This finding should be considered as one of the factors for improving the program because an effective leader can enhance positive outcomes for the programs by enhancing audiences’ knowledge, appreciation, and inspiration (Ham, 2013; Stern et al., 2013).

4.8 Conclusion

The case study at Perth Zoo Camp is a good example of a residential environmental education program run by modern zoos. The program was well structured and the activities were designed to be relevant to the core program ideas. The program was lively and energetic due to good educator delivery and strong student engagement. Even though the program ran over only one night, many of the students’ attitudes and knowledge were significantly improved. Students reported learning a lot of information about animals and conservation from the camp. There is a room for improvement by integrating more information about biodiversity into the content in order to increase the students’ understanding of the connection between wildlife and biodiversity.

Furthermore, Perth Zoo camp should consider improving consistency of camp educators’ communication skills because balance among passionate communication, content, and materials attract and provoke audiences (Mullins, 1984). A training program for camp educators could enhance effective outcomes of the camp. Suggestions for a model for communicating biodiversity and wildlife conservation in Thailand based on these findings are discussed in Chapter 6.
Chapter 5: Characteristics of an environmental residential camp in Thailand (a case study at Sakaerat Environmental Research Station)

5.1 Abstract

This study examined activities aimed at presenting biodiversity and wildlife conservation messages at an environmental residential camp for primary school children in Sakaerat Environmental Research Station (SERS) in the Northeastern region of Thailand. The objectives of this study were to observe and document characteristics of the camp and the activities run with respect to the effectiveness of the messages that were conveyed in each activity. The results of a survey of participating children conducted by camp educators and artwork produced by the children towards the end of the camp provided additional material to examine participating children’s awareness of the camp’s biodiversity and wildlife conservation messages. Fifty-three children from Bangkok, Thailand attended the camp. Forty-nine of those children and their parents gave consent to participate in the study. The results suggested that effective characteristics of the camp were the camp educators’ knowledge and enthusiasm. A characteristic of the camp that could be improved was the content relevance of each activity. Suggestions are made to increase the impact of messages delivered at the camp. By the end of the camp, children demonstrated positive attitudes toward biodiversity and wildlife conservation and an emotional connection with nature.

5.2 Introduction

Biodiversity loss (Sodhi et al., 2004), deforestation (Delang, 2005), and illegal wildlife trading (Nijman, 2010) are ongoing issues in Thailand and Southeast Asia. Between 1961 and 1982, forested areas in Thailand declined approximately three percent each year (Hirsch, 1988). The main causes of forest loss in Thailand and Southeast Asia have been
slash-and-burn cultivation and illegal logging (Delang, 2002). In an attempt to halt and reverse the loss of forested areas, the Thai government established the Royal Forest Department in 1986, which was charged with the reforestation and conservation of the remaining forested area (Delang, 2002). However, forested areas have still decreased over subsequent decades to make way for cash crop agriculture, especially in the north (Tungitiplakorn & Dearden, 2002; Yokoyama, Ogi, & Nalampoon, 2000).

In addition to habitat loss resulting from the removal of forested areas, illegal hunting has detrimental effects on native wildlife. Tungitiplakorn & Dearden (2002) reported that illegal hunting activity was practiced among teenage and adult male members of a hill tribe (the Hmong) for food and social reasons but not for economic reasons. However, large scale wildlife trading has been found at the border of Thailand and Laos as well as in Northeastern Thailand since before the early 1990’s (Srikosamatara, Siripholdej, & Suteethorn, 1992).

Southeast Asia is a major hub for wildlife trading (Sodhi et al., 2004). Wildlife trading emanates from demand for food, clothing, decoration, souvenirs, exotic pets, and traditional medicine (Nijman, 2010; Smith et al., 2009). Nijman (2010) reported that over 30 million animals on the Convention on International Trade in Endangered Species list of wild fauna and flora (CITES) were exported to Japan, the European Union, the United States of America, Canada, Hong Kong, China, Taiwan, Malaysia, and Singapore between 1998 and 2007. Seahorses are a CITES-listed species and it was reported in his study that over 90% of the seahorses’ global trade were exported from Thailand. Moreover, many illegal ivory products are sold in souvenir shops in Thailand even though it is illegal to trade wild elephants and their products in Thailand due to the Wild Animal Reservation and Protection Act of 1992 (WARPA) and the Wild Elephant Protection Act of 1921 (Stiles, 2009).
Illegal trading of wildlife and their products is not the only problem that Thailand's wildlife is facing. Inappropriate use of wild animals for tourism is an ongoing problem in Thailand. For example, domestic elephants in Thailand have been brought into the city, roaming around tourist areas in Bangkok (Pimmanrojnagool & Wanghongsa, 2002). According to Pimmanrojnagool & Wanghongsa (2002), street-roaming elephants can be seen nightly in various parts of Bangkok. A mahout¹ will take their elephant to walk along main roads to restaurants and sell food to people to feed the elephant. They wait around in front of restaurants to persuade people to buy the food which consists of small amounts of fruit and vegetables. A Mahout's income from selling elephant food is approximately 1,000-1,200 Baht (35-40 US dollars) per night which is high compared to the average wage for bachelor degree graduates who earn only 430-600 Baht (15-20 US dollars) per day. Despite the fact that street-roaming elephant activity was banned in metropolitan Bangkok in 1999 (Laohachaiboon, 2010) such activity can still be seen on the outskirts of Bangkok, especially with baby elephants (Lohanan, 2002). As recently as 2014, the researcher witnessed a street-roaming elephant near her hometown in Nonthaburi province, on the outskirts of Bangkok.

Problems of deforestation, illegal wildlife trading and inappropriate use of wild animals are threats to conservation and biodiversity in Thailand. The Royal Thai Government joined the Convention on Biological Diversity in 1992 in Rio de Janeiro, Brazil. Three years later the Biodiversity Research and Training Program (BRT) was established and sponsored by Thailand Research Fund and National Center for Genetic Engineering and Biotechnology (BIOTEC) under the Ministry of Science and Technology (MOST) (Baimai, 2010).

¹ A Hindi word for a person who rides and trains an elephant and remain bonded with the elephant throughout their lives.
MOST primarily supports research and conservation activities. It also provides education to children about the importance of biodiversity and wildlife conservation in order to raise awareness of these ongoing issues. In 2001, MOST appointed the Thailand Institute of Scientific and Technological Research (TISTR) to establish a program called “Dissemination of Biodiversity and Conservation Knowledge for Thai Youth.” This program is a three-day environmental residential camp which is funded by MOST and organized by TISTR’s Knowledge Centre team every year in April at Sakaerat Environmental Research Station (SERS) in Nakhon Ratchasima province, in northeastern Thailand. The researcher was one of the TISTR team members. This program aims to educate and encourage Thai children to conserve native wildlife and natural resources. This study is the first ever study of an environmental camp in Thailand and aims to find out the factors that may improve the outcome of the camp.

Content relevance

Activities conducted in informal learning situations are often active, enjoyable, exploratory, and loosely structured (Boekaerts & Minnaert, 1999). To select or design activities for environmental residential camps, content related to goals and objectives of the camps needs to be explicitly articulated because clear content relevance significantly improves children’s awareness, understanding, and achievement (Oketch, Mutisya, Sagwe, Musyoka, & Ngware, 2012; Rosenshine, 1976; Rudmann, 1994). Children can gain knowledge and positive attitudes towards the environment during environmental residential camps or field trips and are able to retain knowledge from such events (Chapter 3, this thesis; Beard, 2002; Knapp, 2000). Furthermore, children’s attitudes, activity levels, and knowledge about environmental issues have been found to be correlated (Taff, 2004; Taff et al., 2010; Tikka, Kuitunen, & Tynys, 2000). Tikka et al. (2000) found that students who had background knowledge and had done activities related to
nature and the environment had more positive attitudes toward the environment than other students. To improve the outcome of environmental residential camps, the content of each activity needs to relate to the camp’s objectives and be explicitly communicated to the children. This helps achieve the purposes of the camps and enhances the quality of information that children receive (Dettmann-Easler & Pease, 1999; Knapp, 2000).

Taff (2004) examined residential outdoor education camp activities in New Zealand. The camp that Taff examined did not have a specific focus and the children were exposed to various activities during their stay. Taff interviewed eighth grade students (13-14 years old) about their environmental attitudes. He examined changes in their attitudes after attending the camp, as influenced by previous experiences in outdoor and environmental activities. The children reported that the activities in which they directly interacted with nature made them more concerned about the environment. Furthermore, Taff noticed that the environmental attitudes of the children improved after a tree hugging activity which developed children’s sensory awareness of and feelings toward nature.

Dettemann-Easler & Pease (1999) evaluated effectiveness of residential environmental education programs in fostering positive attitudes toward wildlife among 697 students (grades 5 and 6, aged 10 to 12) across the upper Midwest, USA. Their study revealed that unclear goals and objectives in activities were one of the factors that decreased changes in children’s attitudes toward wildlife. They also observed that camp educators often left a session open-ended, without assessing what children learned from the activity. Connections between program goals, thematic concepts, and the activities were rarely made. To maximize effectiveness of the programs, Dettemann-Easler & Pease (1999) suggested that schools and residential centre staff select activities related to the objectives and goals of the programs. Their study suggested that content relevance, clear
goals, and articulated objectives are influential elements for improving children’s attitudes toward environmental and wildlife conservation issues.

Unfortunately, there is limited research examining the content relevance in environmental residential camps. Most research on environmental education content has focused on analysis and coverage in classroom settings. This study documents content relevance in activities conducted at the SERS residential outdoor education camp in northeast Thailand.

**Camp educators’ delivery**

Camp educators or presenters are key to enhancing positive outcomes of camps. Camp educators who are skilled in presenting persuasive communication are linked to more positive attendee outcomes such as satisfaction, appreciation, and emotional connection with the environment (Powell & Stern, 2013; Stern et al., 2013). Furthermore, good presentation of on-site information can help establish intellectual and emotional connections with a place and enhance visitors’ experiences (Ham & Weiler, 2002).

To improve visitors’ experiences, camp educators or presenters should understand what visitors’ expectations are (Falk & Dierking, 2012). Misjudging visitors’ expectations, preferences, knowledge, and attitudes may cause a failure to deliver the message and result in confusion and boredom for visitors (Ross, Norman, & Dorsch, 2003). Researchers have found that visitors preferred to see more demonstrations and engage in activities at the places they visited (Goodrich & Bixler, 2012; Ross et al., 2003). Furthermore, interactive activities or exhibitions are generally preferred over passive atmospheres (Ross et al., 2003; Schreiber, Pekarik, Hanemann, Doering, & Lee, 2013).

By understanding visitors’ preferences, camp educators or presenters are better able to provide more effective programs with clear core program goals for visitors and to increase
positive outcomes for visitors (Schreiber et al., 2013). However, camp educators or presenters who only want to achieve core program goals by aiming to increase visitors’ knowledge have failed to improve visitors’ experiences and appreciation (Longnecker, 2016; Stern & Powell, 2013). In some instances, the approach has even decreased visitors’ concern and negatively affected visitors’ behaviours. Instead, meaningful, confident, and passionate delivery can provoke visitors’ emotions and cause them to reflect on information they gain from camp educators or presenters (Stern & Powell, 2013; Ward & Wilkinson, 2006). This research suggests that to successfully lead a camp or present a program, camp educators or presenters require knowledge as well as presenting skills and personal enthusiasm. Training programs can enhance presenters’ or camp educators’ delivery and presenting skills (Ward & Wilkinson, 2006).

**Children’s engagement**

Children’s engagement is influenced by a positive experience of a learning activity (Azevedo, 2006). It also involves active participation, inner commitment, and focused attention to learning (Lamborn, Newmann, & Wehlage, 1992). It is essential to gauge children’s engagement because desired outcomes are more likely to result from engaged attention (Bitgood, 2013). Children are more engaged with activities when they are being challenged (Lamborn et al., 1992; Shernoff, Csikszentmihalyi, Shneider, & Shernoff, 2003). However, the level of challenge needs to be appropriate to the children’s skill level (Shernoff et al., 2003).

Activities that elicit greater children’s engagement need to be identified. In a study by Shernoff et al. (2003), children were more engaged in cooperative learning activities than in listening to video presentations or lectures. Shernoff and coauthors (2003) also reported that children’s engagement during individual and group work was higher than during inactive activities. Shernoff and coauthors (2003) suggested that activities that
promote active involvement and foster positive emotions are likely to increase engagement.

Ward and Wilkinson (2006) suggest that children’s programs should allow children to work in small groups or alone and activities should encourage children to have interactive and direct experience with nature. To promote positive engagement, camp educators or presenters should also understand children’s characteristics at different ages (Lamborn et al., 1992; Rennie & McClafferty, 1995).

Lamborn et al. (1992) found that an important factor affecting children’s engagement is the relevance or connection of the task to the real world. Gondwe and Longnecker (2015) found that students in a Malawian school who had a teacher who related science lessons to students’ everyday life were better able to make connections between cultural and scientific knowledge in a group meaning map activity. Making activities relevant to what children know can increase children’s engagement. Furthermore, teachers who attempted to make a connection between course content and students’ personal goals or needs gained greater student attention (Frymier & Shulman, 1995). These studies suggest the importance of children’s engagement in achieving program goals.

5.2.1 Research questions

This study was designed to document characteristics of a Thai environmental residential camp at SERS and aimed to answer the following questions:

1) What is the content relevance of different activities at SERS camp to the core program ideas?

2) What are characteristics of camp educators’ delivery and children’s engagement in different activities at SERS camp?
3) How do these characteristics correlate with children's attitudes about the environment?

4) What do children learn from attending SERS camp?

5.3 Methods

5.3.1 Case study description

This study aimed to determine characteristics of the annual residential camp, *Dissemination of Biodiversity and Conservation Knowledge for Thai Youth*, at SERS in order to provide advice for improving the camp activities and increasing the likelihood of achieving the desired outcomes (Krippendorff, 2012; Stern & Powell, 2013). A case study is a common method used in social science research to examine ‘how’ and ‘why’ questions in a complex situation (Yin, 2014). To document the camp in 2012, each camp activity was carefully observed with the following key foci in mind: content and the relationship between content and an activity, camp educator delivery, and children’s engagement. This research was approved by the University of Western Australia’s Human Research Ethics Committee (RA/4/1/5126).

The children who apply to participate in the camp are from various schools in Bangkok. In order to participate in the camp, children must submit an essay about why they want to learn about biodiversity and conservation. The themes of the camp are biodiversity and conservation but the foci change from year to year; in 2012 the foci were water, nature, and wildlife conservation. The core program aims of the camp in 2012 were to raise children’s awareness of water conservation and to encourage them to appreciate nature and support conservation of native wildlife and biodiversity.
5.3.2 Participant demographics

Children

The 53 children who participated in the camp were aged ten to thirteen years (years 5 to 7). They all came from middle class families in Bangkok and went to various schools in the city. Of the 53 participants, 49 children (92%; 28 girls and 21 boys) and their parents provided consent to participate in this study. Parents also provided their permission for academic use of photographs of their children.

Camp educators and carers

All of the six camp educators (see Chapter 3) had their highest degree in a field of related sciences. They were aged between 28 and 49 years. One leader worked at a regional land development centre. Three of them were researchers at SERS. The other two were junior high school teachers. They all volunteered to be camp educators.

The ten carers were master’s degree students aged between 24 and 27 years. All of them had backgrounds in related sciences and were members of a Volunteer Community Development Club at the universities where they were enrolled. The carers assisted the children and helped camp educators lead some activities.

All the camp educators and carers volunteered to work for the camp. They all had previous experience working with children. All six camp educators and ten carers consented to participate in this study and gave their permission for academic use of their photographs taken at the camp.

5.3.3 Data collection

Three sources of data were used to examine and document characteristics of the camp. The first source of data was observations made by the researcher, a native Thai speaker.
The researcher traveled on the bus with the children to SERS and spent three days at the camp with them. The second set of data was children’s artwork. At the end of the camp, the children were given calico bags to take home as a memento of the camp. Acrylic paint was provided and time was provided for each child to paint their bag. The artworks were photographed and analysed as an indication of what the children reflected on at the end of the camp. The third source of data was the official camp report which included results of a survey conducted and analysed by the camp coordinator. The camp coordinator designed the post-camp survey to investigate what children learned from the camp and their impressions during their stay at the camp.

Observation

Observation is a data collection method that allows the researcher to collect in-depth qualitative data, non-verbal data, and verbal data, as well as sensing and experiencing what actually happens in the field (O’Leary, 2013). The relationship of observers with participants and the inherent biases of the observers need to be considered because they can influence observations. In order to avoid these influences, researchers need to think carefully about the best way to conduct their observations. A rigorous method of conducting observations helps ensure the reliability of results. The researcher’s background knowledge about the participants and the activities that needed to be observed influenced the decision to engage in semi-structured, non-participant observation rather than participant observation or non-structured observation.

For this study, non-participant observation was used in order to minimize disruption to the natural setting of the camp and inherent biases from observers. The researcher and the camp coordinator conducted independent observations at the SERS camp from 27 to 29 April 2012. They were both familiar with the environmental residential camp and the activities. Because disclosure of the research and consent to the research were
requirements of the ethics approval, the children and camp educators were aware of the observation process. Observations were semi-structured, using predetermined criteria but not limited to them (O’Leary, 2013). Semi-structured observation was appropriate for this study because it is flexible and suitable for the natural setting of the camp as it allows recording of the unplanned or the unexpected.

Before conducting the observations, a pilot observation protocol key was developed and tested at a Perth Zoo camp in Perth, Australia (see Chapter 4). The key was adjusted to suit the context of the Thai camp. The content covered in each activity, camp educators’ engagement, and children’s engagement were scored from 1 to 5 with 1 being poor and 5 being excellent. Descriptions of content relevance scores are provided in Table 5.1.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>The core program ideas were not mentioned during the activity.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>The core program ideas were addressed during less than half of the camp activity.</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>The core program ideas were addressed in at least half of the camp activity.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>The core program ideas were conveyed during most of the camp activity.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>The core program ideas were clearly and consistently expressed during all or nearly all of the camp activity.</td>
</tr>
</tbody>
</table>

Criteria for scoring camp educators’ delivery during the camp were also developed and adjusted from the pilot test to suit the camp in Thailand. The descriptions for scoring were discussed with other science communication researchers and set up to ensure standard and reliable observations. Descriptions of camp educators’ scores are provided in Table 5.2.
Descriptions for children's engagement scoring are presented in Table 5.3. The descriptions were developed based on results at Perth Zoo camp (see Chapter 4).

**Table 5.2 Description for camp educators' delivery scoring.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>Camp educator appeared unprepared or with inadequate knowledge to communicate or run the camp activity.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>Camp educator appeared partially prepared, had some knowledge to communicate and run the camp activities and paid attention to the needs of the children.</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>Camp educator appeared prepared, paid adequate attention to children and demonstrated some correct knowledge but could present more effectively.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>Camp educator appeared prepared, was attentive to the children or ran the camp activity effectively, but not both.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>Camp educator appeared prepared, enthusiastic, and highly attentive to the children, presented the camp activities effectively and accurately and communicated the core program ideas.</td>
</tr>
</tbody>
</table>

**Children’s artwork**

At the end of the second day of the camp, the children were given a fabric calico bag to take home and were invited to paint their bags. To examine what children reflected on from the camp, the children’s artwork was used as an additional data source because children’s artwork can reflect their thoughts and what they have learned (Walker, 2007). Instruction about how to use acrylic paint was given by carers but no instructions were given about what to paint. The artworks were photographed and kept as digital files for analysis.
Table 5.3 Description for children’s engagement scoring.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Poor)</td>
<td>At least half of the children (24) were off task and doing things irrelevant to the camp activities.</td>
</tr>
<tr>
<td>2 (Fair)</td>
<td>More than half of the children (25-30) showed apparent interest in the camp activity, but many were distracted by the environment (friends, animals and surroundings).</td>
</tr>
<tr>
<td>3 (Satisfactory)</td>
<td>The majority of the children (31-36) were paying attention to the camp activities but not actively participating.</td>
</tr>
<tr>
<td>4 (Good)</td>
<td>Most of the children (37-42) were paying attention to the camp activities and some were actively participating.</td>
</tr>
<tr>
<td>5 (Excellent)</td>
<td>All or almost all (43-49) of the children were actively participating and appeared enthusiastic about the camp activities.</td>
</tr>
</tbody>
</table>

Camp report

The camp coordinator designed the post-camp survey to evaluate the camp. Surveys were distributed by the carers to the children at the end of the camp. The children were asked to fill out the surveys and hand them in before going back to Bangkok. All the surveys were analyzed by the camp coordinator and the camp report was given to the author two weeks after the camp ended (Appendix 6). The researcher was not able to access the raw quantitative data from the survey. However, all the answers from open-ended questions were recorded in the report and these answers were thematically analysed. Care was taken with translation to ensure meaning was captured (Kaji, 1993). The report was translated from Thai to English by the author and verified by a private English language centre in Thailand. Back translation (McGorry, 2000) was conducted for further validation by a colleague who spent her childhood in both the United States of America and Thailand and is fluent in both English and Thai.
5.4 Data analysis

5.4.1 Observation data

Observations were divided into a quantitative data set and qualitative data set. An ordinal scale was applied and descriptive statistical analysis was conducted using SPSS. The qualitative data were gathered from notes taken by the two observers during each activity and divided into three categories: student engagement, camp educator delivery, and characteristics of each activity. Quantitative data were collated at the end of the camp from scoring sheets recorded by the two observers. Scores were compared and, if scores differed, they were discussed by the two observers until an agreement was reached. For example, in one instance, the first observer scored one camp educator 5 for delivery but the second observer scored the same camp educator 4. The second observer explained that she scored the camp educator 4 because he did not include the core program ideas in his conclusion after the activity ended. The first observer agreed with this assessment and the score was changed to 4. This example illustrates the value of discussion based on criteria and score description to ensure reliable data collection.

5.4.2 Children’s artwork

The children’s paintings on calico bags, which they painted at the camp and took home, (Table 5.4) were analysed because they reflected the children’s thoughts towards the end of the camp. The artwork of the children was examined and an artwork coding manual was developed. The author examined all the children’s artwork. The artwork was coded into seven themes: conservation, animals, nature, humans coexisting with nature, animal and habitat, camp activity, and unrelated. Descriptions for the coding of each theme were discussed with five other experienced science communication researchers to ensure reliable coding (Table 5.4). Initial intercoder reliability between the researcher and the supervisor was 77%. Discussion was particularly needed to establish reliability because
### Table 5.4 Coding manual for children’s artwork on calico bag.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description of theme</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td>Some aspect of conservation</td>
<td></td>
</tr>
<tr>
<td>Animal</td>
<td>Animal without a connection to nature</td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>Trees and other natural surroundings without humans or animals</td>
<td></td>
</tr>
<tr>
<td>Human coexisting with nature</td>
<td>Human or a house in a nature setting</td>
<td></td>
</tr>
<tr>
<td>Animal and habitat</td>
<td>Animal living in nature or animal with tree or flower</td>
<td></td>
</tr>
<tr>
<td>Camp activity</td>
<td>An aspect of a planned camp activity</td>
<td></td>
</tr>
<tr>
<td>Unrelated</td>
<td>Unrelated to other themes</td>
<td></td>
</tr>
</tbody>
</table>
the supervisor did not speak or read Thai and could not understand Thai words written on some artwork which affected the interpretation of the artwork. After discussion which included translations of the Thai words in the artwork, intercoder reliability increased to 90%.

5.4.3 Camp report

Responses to all of the open-ended questions from the survey were recorded in the report and made available for analysis. The answers were coded into several categories using thematic content analysis. As all the answers were written in Thai, the researcher worked with the camp coordinator to design and ensure the reliability of the coding manual. The first coding manual was for children’s impressions of the camp (Table 5.5). Initial intercoder reliability was 94%.

The second coding manual described children’s answers about what they learned from the camp. The author worked with the camp coordinator to design and ensure the reliability of the coding manual which included six categories (Table 5.6). Initial intercoder reliability was 98%, reflecting the relatively simple and straight-forward answers provided.

The last part of the camp report included suggestions for improving the camp and an overall satisfaction scale. There were twelve suggestions for improving the camp which were recorded and translated into English. Examples of the children’s suggestions are presented in the next section.
Table 5.5 Coding manual for children’s responses to survey question: “What impressions did you get from the camp?”

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description of theme</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities</td>
<td>Mentioned things about the facility such as food accommodation and transportation</td>
<td>- Food.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I liked the food, the place and the camp educators.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Transportation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The food was very yummy.</td>
</tr>
<tr>
<td>Socialisation</td>
<td>Mentioned things about socialisation such as getting to know the camp educators, to make new friends, to cooperate performing in the shows, or to participate in the games (ice-breaking activity)</td>
<td>- I loved making new friends at the camp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I liked acting in the show. I felt like I was a different person for 10 minutes. I really enjoyed acting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The camp took good care of us.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The camp educators were smart. I learned a lot from them.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I liked the fire twirling show and the contact juggling show by the camp educators.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The fire twirling show.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I liked all the shows at night.</td>
</tr>
<tr>
<td>Outdoor activities</td>
<td>Mention things about outdoor activities which were: Water Story Rally; Stargazing and Bug Trapping; Bird Watching, Finding Siamese Fireback Pheasant; Hiking; and My Friend</td>
<td>- I enjoyed watching stars and bugs trapping at night. It was fun.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Finding Siamese Fireback pheasant was the best, especially if I had seen female ones.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hiking and the cool weather in the forest was nice and learning a lot of things.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Getting close to the Siamese Fireback pheasant was awesome.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hiking. I loved it when I saw the native wildlife.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- ‘My Friend’ activity was fun and scary at the same time.</td>
</tr>
<tr>
<td>Indoor activities</td>
<td>Mention things about indoor activities which were: a slide show on a topic “Where Did the Water Come From?”; and Bag Painting</td>
<td>- Bag painting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I liked painting the bag the most.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I loved painting the bag at the camp. It was fun.</td>
</tr>
</tbody>
</table>
Table 5.6 Coding manual of children’s responses to survey question: "What have you learned from the camp?"

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description of theme</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reliance</td>
<td>Mention things about be able to take care of myself and be responsible</td>
<td>- I learned to take care of myself.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about patience, honesty and responsibility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned to rely on myself.</td>
</tr>
<tr>
<td>Socialisation</td>
<td>Mention things about making new friends, friendship and cooperation or teamwork</td>
<td>- I learned to make new friends.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Teamwork and be responsible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about teamwork.</td>
</tr>
<tr>
<td>Conservation</td>
<td>Mentioned things about conservation issues or conservation activities such as reuse, recycle and energy saving</td>
<td>- I learned about energy saving and I want to save more energy at my house.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned how to reuse the soft drink cans.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about water processing and water conservation.</td>
</tr>
<tr>
<td>Animal</td>
<td>Mentioned things about animals such as native species, insects and wildlife</td>
<td>- I learned about Siamese Fireback Pheasant and the local birds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about bird species.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about bugs.</td>
</tr>
<tr>
<td>Environment</td>
<td>Mentioned about nature or environment such as the forest, water, biodiversity, stars, and the sky</td>
<td>- I learned about where water came from.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about different types of forest.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned about nature and stars.</td>
</tr>
<tr>
<td>New experiences or skills</td>
<td>Mentioned things about learning new things such as painting and hiking</td>
<td>- I had some experience in hiking and testing edible things in the forest.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How to paint with acrylic paint.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I learned how to survive in the forest.</td>
</tr>
</tbody>
</table>

5.5 Results

5.5.1 Observations of camp activities

On the first day of the camp, the children met in Bangkok, departing for the camp at 8:00 am on a chartered bus with the camp coordinator, carers, camp educators and the researcher. A few parents drove their children to the camp themselves. A video of
American wrestling from the World Wrestling Federation (WWF) was played on the bus for most of the journey because one child had brought it along and asked the carers to play it. The children arrived at the camp around 11:45 am, put their belongings in the provided accommodation (boys and girls were separated), and came back to meet at the cafeteria for a lunch buffet. The first activity started after lunch at around 1:00 pm. The children’s engagement, the camp educators’ delivery, and the content covered in each of the ten camp activities were observed and scored (see Table 5.7) according to the observation protocol keys (Tables 5.1 to 5.3). Observations of each activity are described in the sections below.

Activity 1: Welcome Ceremony /Ice-breaker Games (Duration 120 minutes)

Activity 1 was Welcome Ceremony/ Ice-breaker Games which lasted from 1.00 pm to 3.00 pm after lunch. It was held in the main hall of SERS. During the activity, the children got to know their new friends, were informed about the rules and regulations of the camp, and played games. Camp educators were fun and enthusiastic (Figure 5.1). All of them got along with children very well, laughing while playing together with the children. The majority of the children were happy and relaxed after their bus ride. The atmosphere during Activity 1 was friendly and informal. However, the children were a bit tired after Activity 1 which went an hour over time because they spent lots of time playing games. The children seemed to be uncertain about the theme and the core program ideas of the camp because the camp educators did not clearly explain the theme and the objectives of the camp to the children. Moreover, the content of Activity 1 did not relate to the camp’s core program ideas.
Table 5.7 Observations of activities at the SERS camp for children aged ten to thirteen years old. Observations were scored on a scale from 1 to 5 with 1 = Poor; 2 = Fair; 3 = Satisfactory; 4 = Good; 5 = Excellent (See Tables 4.1-4.3).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (minutes)</th>
<th>Content ^A relevance</th>
<th>Camp ^B educators' delivery</th>
<th>Children's ^C engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td>Activity 1: Welcome Ceremony/ Ice-breaker</td>
<td>120</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Activity 2: Where Did the Water Come From?</td>
<td>45</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Activity 3: Water Story Rally</td>
<td>80</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Evening</td>
<td>Activity 4: Stargazing and Bug Trapping</td>
<td>90</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Day 2</td>
<td>Morning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activity 5: Finding Siamese Fireback Pheasant</td>
<td>120</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Activity 6: Hiking</td>
<td>180</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Activity 7: Bag Painting</td>
<td>180</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Afternoon</td>
<td>Activity 8: Show</td>
<td>120</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Evening</td>
<td>Activity 9: Bird Watching</td>
<td>120</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Activity 10: My Friend (tree hugging)</td>
<td>120</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

For score descriptions:  A see Table 4.1; B see Table 4.2; C see Table 4.3
Activity 2: Where Did the Water Come From? (Duration 45 minutes)

Activity 2 provided relevant information about water. It started immediately after Activity 1. Two fifteen-minute slide and video presentations were shown to the children (Figure 5.2). The first slides explained where water comes from. The slides contained only still photos and text. The second presentation was an animated video about the importance of water. The style of presentation of these videos was didactic, and similar to what the children would experience in a classroom. Most of the children seemed to be bored and some children fell asleep during the first presentation. However, children tended to pay more attention to the second presentation which included animations. After the presentations ended, the camp educators asked questions related to both presentations. Only a few children participated by answering questions and asking their own.
Activity 3: Water Story Rally (Duration 80 minutes)

Activity 3 started immediately after Activity 2 ended. This activity consisted of five platforms. The first platform was called River Source. Each child was required to find a picture of a water-drop, match it with one of the provided environment pictures, and write down how the pictures were related. The second platform was called Water Flows. The activity in this platform was similar to putting a jigsaw puzzle of a river together, but all the children were required to step on the jigsaw pieces and progress along the jigsaw pieces until they reached the other side of the river. The children were divided into two teams and the team that reached the other side first were declared the winners. The third platform was called Water Consumption. In this platform, children were paired and asked to deliver a glass of water on a tray through obstacles to a destination (Figure 5.3). The fourth platform was called Water Conservation. Each child was asked to find hidden pictures of water and put them into boxes labeled "Conserve" and "Destroy". The fifth platform was called Water Management. Each child was required in turn to put on a blindfold and draw a picture of a person with assistance from the team members. After
observing the activities on each platform, it was obvious that most of the children enjoyed working together as a team. Most of them actively participated. However, the content covered in each activity was not clearly explained. After the activities ended, the camp educators spent little time summarizing the core ideas of the activities in each platform.

![Image](image.png)

**Figure 5.3** Children helped each other carry a glass of water on a tray through obstacles at the third platform (Water Consumption) of Activity 3 (Water Story Rally).

**Activity 4: Stargazing and Bug Trapping  (Duration 90 minutes)**

This activity was held at night after dinner from 8.30 pm to 10.00 pm in the forest. Most of the children were quite relaxed. Some of them were able to recognise and name stars they saw. Children were told about bugs and biodiversity by using an example comparing the numerous mosquitos in Bangkok to the few mosquitos and greater variety of other bugs at SERS (Figure 5.4). The camp educators covered important information about biodiversity related to bugs but the delivery style was didactic (lecture-like) and perhaps was too boring for some children. Seven of the children were not interested in bugs or stars and did not engage with the activity. They were off-task, talking to each other. Children could see good examples of biodiversity while they were trapping bugs. While stargazing, the children learned about pollution in Bangkok and the importance of trees.
Activity 5: Finding Siamese Fireback Pheasant  (Duration 120 minutes)

After breakfast on the second morning, the children sat on the back of a big truck at 6 am and were taken into the forest for about two hours. This activity involved looking for the Siamese Fireback Pheasant (the national bird of Thailand) in the wild (Figure 5.5). The truck was parked far from the pheasant habitat and the children had to walk quietly to the pheasant habitat and wait quietly to see the Siamese Fireback Pheasant. Most of the children were excited to see a Siamese Fireback Pheasant and were interested in learning more about them. They asked many questions about the Siamese Fireback Pheasant, for example, about the difference between males and females and about the food that the pheasants eat. The camp educators confidently discussed the importance of conserving this native species. Around five to six children were so excited to see the pheasant and were so busy taking photos that they did not pay attention to the information given by the camp educators.
Activity 6: Hiking (Duration 180 minutes)

After Activity 5, the children were taken back to the main hall of SERS and were given 30 minutes to prepare themselves for a five kilometer hike. The children were divided into five groups of ten to eleven. Two carers and one camp educator were assigned to accompany the children in each group. During the hike, children were asked to take notes and submit them afterward. The camp educators confidently provided useful information about the importance of the forest, types of trees in different types of forest, and the animals that live in different types of forest (Figure 5.6). The majority of the children were excited to be in the forest and actively participated. They were able to see birds and white squirrels. Some of the children were distracted by the environment and were slightly tired. Though the children were asked to take notes and submit them afterward, half of the children did not take notes during the hiking. Instead they copied notes from friends and submitted them to the camp educators. Lunch was provided at a meeting point in the middle of the forest before the children headed back to SERS.
Activity 7: Bag Painting (Duration 180 minutes)

After the children returned to SERS, they were given calico bags and acrylic painting sets. The children were told they could paint anything. They were also informed that there would be a bag contest afterward and that the judges were the carers and the camp educators. Most of the children seemed to enjoy painting their bags (Figure 5.7). The children seemed to be relaxed after the long walk in the forest. During the activity, the camp educators encouraged children to use their bags instead of plastic bags when they go shopping with their parents. However, the activity was allocated too much time. Some children finished the painting early and had nothing else to do.

Activity 8: Show (Duration 120 minutes)

The children were divided into five groups and asked to perform a show related to topics that they drew from a hat before dinner. The topics related to things that had happened during the previous two days: animals, conservation, and the environment. The children were given an hour to prepare for their shows after the dinner. Most of the children actively participated and performed good shows related to the topics. Some of the shows
did not quite relate to the topics provided. The camp educators and the carers also performed their own shows for the children. The camp educators’ and carers’ shows were not related to the provided topics or the core program ideas of the camp (Figure 5.8). However, the majority of the children were excited to see the shows performed by the camp educators and the carers. This activity finished around 10 pm.

![Image](image_url)

**Figure 5.7** The children painting their own calico bags to take home as a memento of the camp.

**Activity 9: Bird Watching (Duration 120 minutes)**

This activity was held in the early morning of the third and last day of the camp. The children were led quietly into the forest to watch birds. They were given binoculars and instructions about how to use binoculars properly. Most of the children were enthusiastic about this activity (Figure 5.9). The camp educators were knowledgeable about native birds. A few children asked a lot of questions about the birds they saw. This caused loud noises and scared birds away. When some children (5-7 children) could not see birds, they gave up and stopped participating.
Figure 5.8 A camp educator performed flame twirling during Activity 8 (Shows).

Figure 5.9 The children enjoyed looking for birds.
**Activity 10: My Friend (Duration 120 minutes)**

This activity was the last activity of the camp. The children gathered at the main hall and were blindfolded. They were taken one at a time by the carers into the forest to hug a tree which was suggested to be their new friend. The children were excited because they could not see where they were being taken and what they would be doing. After tree-hugging, all of the children were asked to write a promise to take care of trees on a piece of paper and stick it on a picture of a big tree in the main hall. All of the children’s promises mentioned one of three things: 1) to plant more trees, 2) to not cut down trees, and 3) to save energy. As time ran out, the camp educators briefly discussed the importance of trees in the environment but most of the children did not pay attention because they were ready to go home and were keen to exchange their social media (Facebook) accounts with their friends, the camp educators, and the carers.

**Overview of all activities**

While the content of Welcome Ceremony/Ice-breaker Games (Activity 1), Bag Painting (Activity 7), and Show (Activity 8) had little relevance to the core program ideas, the children were actively engaged in those activities. Relevant content and strong engagement were not mutually exclusive, as in Where Does Water Come From? (Activity 2). The majority of the children showed strong engagement in the Finding Siamese Fireback Pheasant (Activity 5), Hiking (Activity 6), and Bird Watching (Activity 9) and the relevance of content in those three activities scored highly.

All camp educators were knowledgeable on the camp’s topics. They were well prepared for every activity and enthusiastic about leading each activity. However, they did not consistently explain the objectives of each activity to the children. The camp educators
occasionally used poor timing in telling jokes about superstition which may have caused confusion for some children between fact and fiction.

![Figure 5.10 Promises that children made to the tree.](image)

### 5.5.2 Analysis of children’s artwork

Although not directed to paint any particular content, almost all of the children painted nature, animals, or plants (44 of 49 paintings). Most of the children painted a picture of the nature surrounding them. As some pictures represented two or three themes, the total percentage of representations is greater than 100% (Table 5.8). Thirteen of the forty-nine paintings were pictures of nature alone. Themes of humans coexisting with nature and human habitats were each found in twelve paintings. The most common paintings in the animal theme were of the Siamese Fireback Pheasant, birds, and white squirrels that
the children had seen around SERS. Themes of conservation and unrelated themes were each found in five paintings. Examples of unrelated themes were shapes or a cartoon.

Table 5.8 Thematic coding reports from children artwork.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
<th>Number of artworks (N)</th>
<th>Percentage of artwork found in each theme (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>Trees and other natural surroundings without humans or animals</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Human coexisting with nature</td>
<td>Human or a house in a nature setting</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Animal and habitat</td>
<td>Animal living in nature or animal with tree or flower</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Animal</td>
<td>Animal without a connection to nature</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Camp activity</td>
<td>An aspect of a planned camp activity</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Conservation</td>
<td>Some aspect of conservation</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Unrelated</td>
<td>Unrelated to other themes</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

5.5.3 Analysis of camp report

Children's satisfaction

The first part of the camp report described children's satisfaction with facilities and activities at the camp. The children were asked to score their responses on a Likert type scale (not at all satisfied, slightly satisfied, somewhat satisfied, very satisfied, and extremely satisfied). The majority of the children said that they were extremely satisfied with the camp educators and with the food provided (Table 5.9). More than half of the children said that they were extremely satisfied with the transportation and with the accommodation provided. The children were most satisfied with the camp educators and least satisfied with the accommodation.
Table 5.9 Children's satisfaction of the facilities at the SERS camp.

<table>
<thead>
<tr>
<th>List of facility</th>
<th>Not at all satisfied (%)</th>
<th>Slightly satisfied (%)</th>
<th>Somewhat satisfied (%)</th>
<th>Very satisfied (%)</th>
<th>Extremely satisfied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp educators</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>86</td>
</tr>
<tr>
<td>Food</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>20</td>
<td>72</td>
</tr>
<tr>
<td>Transportation</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>31</td>
<td>57</td>
</tr>
<tr>
<td>Accommodation</td>
<td>-</td>
<td>6</td>
<td>10</td>
<td>31</td>
<td>53</td>
</tr>
</tbody>
</table>

Almost all children were extremely or very satisfied with all of the camp activities (Table 5.10). The children were most satisfied with the Welcome Ceremony/Ice-breaker Games (Activity 1), followed by Finding Siamese Fireback Pheasant (Activity 5) and Show (Activity 8). The least satisfactory activities were Where Did the Water Come From? (Activity 2), Stargazing (Activity 4), and My Friend (Activity 10).

Children's impressions

The second part of the report recorded the children’s answers to open-ended questions. Children were asked to answer three questions about their impressions of the camp, the knowledge they gained from the camp, and their suggestions for a better camp. Their responses were coded using the themes presented in Table 5.5.
<table>
<thead>
<tr>
<th>List of activity</th>
<th>Satisfaction scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all satisfied (%)</td>
</tr>
<tr>
<td>Activity 1: Welcome Ceremony/ Ice-breaker</td>
<td>-</td>
</tr>
<tr>
<td>Activity 5: Finding Siamese Fireback Pheasant</td>
<td>-</td>
</tr>
<tr>
<td>Activity 8: Show</td>
<td>-</td>
</tr>
<tr>
<td>Activity 6: Hiking</td>
<td>-</td>
</tr>
<tr>
<td>Activity 7: Bag Painting</td>
<td>-</td>
</tr>
<tr>
<td>Activity 9: Bird Watching</td>
<td>-</td>
</tr>
<tr>
<td>Activity 3: Water Story Rally</td>
<td>-</td>
</tr>
<tr>
<td>Activity 10: My Friend</td>
<td>-</td>
</tr>
<tr>
<td>Activity 4: Stargazing and Bug Trapping</td>
<td>2</td>
</tr>
<tr>
<td>Activity 2: Where Did the Water Come From?</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 5.11 shows that 40% of the children were most impressed with outdoor activities such as Finding Siamese Fireback Pheasant (Activity 5) and Hiking (Activity 6). The only indoor activity mentioned (27% of the children) was Bag Painting (Activity 7). None of the children mentioned the presentations on Where Did the Water Come From? (Activity 2). Nineteen percent of the children mentioned that they were impressed by the camp educators and carers and enjoyed socialising with new friends at the camp. Only thirteen percent of the children mentioned that they were most impressed by the food, accommodation, or transportation.
Figure 5.11 The proportion of children’s responses highlighted being most impressed by different types of activities at the SERS camp.

Figure 5.12 Proportion of types of topics children reported learning about at the SERS camp.

Figure 5.12 thematically summarizes what children reported learning from the camp. Twenty-eight percent of the children mentioned learning about the environment. Socialisation and new experiences were mentioned equally, by 20% of the children. Eighteen percent of the children mentioned that they had learned about animals. Eight percent of the children mentioned that they had learned self-reliance. Only five percent of the children mentioned learning about conservation and this may be because the children
considered conservation as being water saving, which was taught at the camp during the Activity 2 and 3.

There were twelve suggestions for improving the camp made by children. Ten answers were about accommodation and two related to the transportation. None of the suggestions involved content or the activities. Examples of answers are shown below.

“Need to fix the insect screen in girl’s room. There were so many ants too.”
“There were so many ants in room 1026.”
“Need air conditioning in every room and the water in the water cooler should be cold.”
“The bedroom should have a toilet inside.”
“More movies on the bus instead of WWE wrestling matches.”
“The bus driver should drive faster.”

5.6 Discussion

The camp at SERS was enjoyable and allowed the children to socialise. The camp educators demonstrated confidence, enthusiasm, highly engaging delivery, and a good rapport with the children. Enjoyable, enthusiastic, and engaging delivery are important for developing an effective program for children (Barriault & Pearson, 2010; Hammerman & Hammerman, 1982; Kimble, 2014). However, an effective program needs to have relevant content support throughout (Hammerman & Hammerman, 1982). Relevant content can be integrated with activities provided in the program. By setting clear goals, objectives, or core program ideas for the program, suitable content can be articulated with activities.

In the camp at SERS, the goals and core program ideas were not clear to the children. The activities such as Welcome Ceremony/ Ice-breaker (Activity 1), Water Story Rally (Activity 3), Bag Painting (Activity 7), and Show (Activity 8) had low content relevance. Nonetheless, these activities were fun and interactive, resulting in a high level of children’s engagement. This is consistent with the findings of Bitgood (2013), Lamborn et al. (1992), and Rennies & McClafferty (1995) on children’s engagement. However, the children hardly
learned about conservation from those activities. Although the camp educators were well-prepared, enthusiastic, showed strong engagement in delivery, and engaged children, some activities they provided were not relevant to the core program ideas or content. The children were not able to understand the purpose of these activities and these activities apparently did not contribute to the children learning about conservation. This finding is consistent with those of Dettmann-Easler & Pease (1999), who found that children's knowledge and changes in their attitude toward wildlife were influenced by clear core program ideas, thematic concepts, and relevant activities.

Activities such as Stargazing and Bug Trapping (Activity 4), Findings Siamese Fireback Pheasant (Activity 5), Hiking (Activity 6) and Bird Watching (Activity 9) at the SERS camp were challenging, interactive and exposed children to nature which resulted in a high level of children's engagement. This finding is consistent with the studies from Lamborn et al. (1992) and Shernoff et al. (2003). The results were also confirmed by the report of children's satisfaction scale of the activities (Table 5.10) and their impression of the camp (Figure 5.11).

Note-taking has been found to be an unpopular activity during school excursions (Ballantyne & Packer, 2002). That was also the case at the SERS camp during Hiking (Activity 6), when half of the children failed to take notes during the activity. Note-taking did not contribute to these children's learning and possibly created a negative experience for some.

Where Did the Water Come From? (Activity 2) was the only activity that had a low level of children's engagement. This activity ranked the lowest of all activities for satisfaction. When the children were asked what impressed them the most, only one of them mentioned this activity. The children did not enjoy having a classroom style activity like a
presentation during the environmental residential camp. Other studies have found children are more likely to engage at environmental camps through physical activities (Dettmann-Easler & Pease, 1999; Ward & Wilkinson, 2006).

The children's artwork show an awareness about positive attitudes towards biodiversity and wildlife conservation which they expressed by painting pictures of nature, humans coexisting with nature, animals and habitats, and even some aspects of conservation. This finding suggests that the children had awareness and positive attitudes towards biodiversity and wildlife conservation. However, it does not guarantee stewardship or pro-environmental behaviour later in life because behaviour is complex and involves many factors, such as personality, knowledge, education, social class and norms, as well as childhood experiences (Gifford & Nilsson, 2014; Longnecker, 2016). A consistent, effective follow-up program promoting biodiversity and wildlife conservation is still needed to encourage the children.

The children's suggestions for improving the camp reveal that children do not associate their well-being with conservation as some girls complained about insects and bugs in their bedrooms and some boys wanted to have air conditioning in their bedrooms. This finding is consistent with earlier research that, although urban children have positive attitudes towards biodiversity and wildlife conservation, they may not have experience with (Freeman, van Heezik, Hand & Stein, 2015) or associate their well-being with wildlife and conservation (de White & Jacobson, 1994).

This study provides a holistic picture of the environmental residential camp at SERS. It shows that content relevance, camp educator delivery, and children's engagement all have an impact on the outcomes of the camp. Coverage of relevant content in each activity is an important factor in influencing children’s knowledge about biodiversity and
wildlife conservation. Camp educators' delivery is a key factor in encouraging children's positive attitudes towards biodiversity and wildlife conservation.

5.7 Conclusion

The SERS residential camp provided children with unique experiences in nature and fostered children's awareness and positive attitude toward biodiversity and wildlife conservation. Enjoyable activities, the opportunity to socialise, and enthusiastic camp educators were important characteristics of the camp. These characteristics resulted from camp educators who were knowledgeable, enthusiastic, passionate, and able to interact comfortably with the children. Effective camp educators appeared to increase the children's level of engagement. There is room for improvement by integrating activities with more relevant content or explicitly describing and reinforcing the intended messages to enhance the desired outcomes of the camp. Ballantyne and Packer (2002) suggested that all the activities and excursions should be carefully designed to consider children’s expectations. Frymier & Shulman (1995) made similar recommendations. The design of the activities for environmental learning should allow children to engage with nature emotionally and should encourage long-term behavior change (Clayton & Myers, 2009; Malone, 1999). Therefore, the activities need to be well designed and constructed to relate to the camp’s objectives in order to truly connect the children with nature. Last but not least, pre- and post-visit activities are recommended to improve children’s learning processes at the camp. The development and suggestion of a model for the camp in Thailand are discussed in Chapter 6.
Chapter 6: A model for communicating biodiversity and wildlife conservation for Thai Children

This chapter integrates and summarises triangulated findings from Chapter 3, 4 and 5 to help answer the research questions. It then uses what has been learned to develop recommendations for a residential camp which aims to educate Thai children about biodiversity and wildlife conservation. The research confirms that children’s environmental learning processes are influenced by children's engagement, camp educators’ delivery, and content relevance. Positive attitudes and awareness are also influenced by children’s engagement. Therefore, the development of a model for communicating biodiversity and wildlife conservation with Thai children is needed to focus on factors influencing children's engagement and children's knowledge control because children may have a willingness to display pro-environmental behaviour when they have positive attitudes and awareness toward biodiversity and wildlife conservation.

The main cultural difference observed in the two environmental camps studied for this thesis was that Thai children were less likely to express their opinions and feelings than Australian children. Thai children did not ask questions or express their ideas or thoughts during the camp. Thai children are taught not to reveal emotions directly or oppose others openly (McCarty et al, 1999) unlike Australian children who are taught to express their thought and ideas openly. This is common for children in Southeast Asia as they are taught to listen quietly to what adults say (McCarty et al, 1999). Thai children are also taught to be respectful of adults and be polite, especially with teachers or superiors. Although Thai children are allowed to ask questions, adults may interpret it as "talk back" which makes children avoid asking questions. If Thai children are to ask questions of adults, teachers or superiors and openly discuss potentially contentious issues, they need to be encouraged to do so by those in positions of authority. Because of the lack of
questions and discussion by Thai children, it can be difficult to ensure that they clearly understand messages of the camp. Otherwise, surprisingly few cultural differences were observed between the two camps and it was determined that all of the activities from Perth Zoo camp could be adapted to environmental camps in Thailand.

6.1 Factors influencing children’s engagement

Camp educators

Interviews with camp educators (Chapter 3) and observations at Perth Zoo (Chapter 4) and SERS (Chapter 5) provided evidence of the vital role of camp educators in influencing children’s engagement. This is consistent with other research findings (Ham, 2013 and Stern, 2008). The interview findings suggested that the enthusiasm of the camp educators stemmed from their passion for wildlife and the environment. Harmonious passion has a positive effect on work satisfaction which makes people enjoy engaging in their tasks (Philippe, Vallerand, Houlfort, Lavigne, & Donahue, 2010; Suchy, 1999; Thorgren, Wincent, & Sirén, 2013; Yahui & Jian, 2015). The passion of an individual provides motivation for engagement in their tasks (Philippe et al., 2010). Passion can result in the ‘flow’ that an individual experiences when absorbed in the joy and accomplishment of life (Csikszentmihalyi, 1997). Passion can result from personal experiences and childhood memories (Neumann, 2006). As such, a high engagement in work is correlated with an individual’s past experiences as well as passion.

The interviews described in Chapter 3 revealed that all of the camp educators had past experiences related to animals and environmental education for young children. They were all passionate about animals, the environment, and conservation. Results from Chapters 4 and 5 showed that the camp educators were well engaged with their work (Table 4.5 and Table 5.7). Most of them received a high score for leading camp activities,
with high scores for delivery more consistent among the SERS camp educators. With the
greater variability of delivery amongst Perth Zoo camp educators, a significant correlation
was found between Perth Zoo camp educators' delivery and the children's engagement.
The number of participants at the SERS camp was insufficient for statistical analysis but
the consistently high scores of SERS camp educators would likely have precluded finding
statistical differences. The children at the SERS camp were more likely to report being
satisfied with activities which they found engaging. The engagement observation results
(Table 5.7) and the report of children's satisfaction with the activities (Table 5.10) were
examined to see if there was a relationship between the two. The results showed that an
activity with low engagement from both parties also received a low score in children’s
satisfaction. This finding provides support for an effect of camp educators' delivery on
children's engagement. Enthusiasm and passion for animals, the environment and
conservation are characteristics of camp educators that are likely to increase children’s
engagement.

**Camp educators’ rapport with children**

Observations of the two camps revealed that camp leaders who had a good rapport with
the children received more attention from the children. At Perth Zoo camp (Chapter 4),
two camp educators demonstrated rapport with children particularly well when they were
leading Activity 6: Habitat Hop. This made the atmosphere more fun and lively as camp
educators and children were emotionally engaged (Figure 4.6). As for the SERS camp
(Chapter 5), all of the camp educators exhibited a good rapport with the children. They
created a fun and lively atmosphere especially during Activity 1: Welcome Ceremony/ Ice-
breaker games. This was one of the children’s favourite activities with 80% of the children
reporting that they were extremely satisfied with this activity (Table 5.10).
Building up a good rapport with children requires more than just good communication skills. It is important to understand their world, respect their opinions, and express corrections such that children do not feel insulted or disrespected (Peel, 2004). Camp educators must keep in mind that their primary role is not to discipline but to provide knowledge and increase positive attitudes and awareness about wildlife and conservation. The children also expect to have a good time with activities in which they are involved and they like to discuss and share things differently than in the classroom (Ballantyne, Fien, & Packer, 2001).

**Enjoyable and interactive activities**

Enjoyable and interactive content was found to be one of the factors that influences children's engagement. In the interviews described in Chapter 3, many camp educators suggested that enjoyable and interactive activities would help set up an effective camp. This suggestion is supported by the results of the case studies. During the Perth Zoo camp (Chapter 4), Activity 7: Giving Enrichment scored the lowest in engaging the children (Table 4.5) because the children only listened to the zookeepers after they put the enrichment for the animals in the enclosure. The children were off-task after they left the enclosure (Figure 4.7) because the activity did not require enough participation from them. During the SERS camp (Chapter 5), Activity 2: Where Did the Water Come From? received the lowest engagement score for the children (Table 5.7) because the activity was didactic, not interactive, and the children did not appear to enjoy it (Figure 5.2). The children were asked to score their satisfaction with every activity and Activity 2 received the lowest score (Table 5.10). When the children were asked about their impression of the camp, none of them mentioned that they were impressed by this activity. In contrast, other activities that received high engagement scores, such as Activity 5: Finding Siamese Fireback Pheasant and Activity 6: Hiking, were mentioned as impressive activities. These
findings from the two case studies yielded meaningful results about characteristics of activities that influence children's engagement.

6.2 Factors influencing children's knowledge

Engagement

In the two case studies, there was a relationship between camp educators’ delivery and the children’s engagement (Table 4.6 and Table 5.7). There is no doubt that camp educators’ delivery has an influence on children's engagement. However, camp educators’ delivery not only influences children’s engagement but also children's knowledge. When children are engaged, they tend to gain more knowledge (Klem & Connell, 2004; Reyes, Brackett, Rivers, White, & Salovey, 2012) and are more likely to incorporate what they learn into their lives (Newmann, 1992; Shernoff et al., 2003).

The findings from the case studies at the two camps revealed relationships between engagement and knowledge gained. The highest scores for camp educator delivery and children's engagement were found in Perth Zoo’s Activity 2: Habitat Real Estate (Table 4.5). This activity provided children knowledge about types of animals and their habitats as well as about how they could help conserve animal habitats. There were significant changes in responses to the statements "My life has impact on wildlife conservation" and "I know a lot of things I can do to help wildlife" (Table 4.9). Among the results of the mind map analyses of children's learning (Table 4.10), types of animals and habitats were mentioned the most by children.

At the SERS camp, the closest relationship between the camp educators' delivery and the engagement of the children was observed in Activity 5: Finding the Siamese Fireback Pheasant and Activity 6: Hiking. These two activities provided children knowledge about
nature, the environment, forests, and the Siamese Fireback Pheasant (Thailand’s national bird). Among the results of the children's artwork (Table 5.8), the most common paintings were pictures of nature (trees and other natural surroundings without humans) and animals. When the children painted animals, the most common picture was the Siamese Fireback Pheasant. Survey results revealed that the topic the children learned most about was the environment (Figure 5.12). Being in a residential camp in a natural environment, quite different to being home in Bangkok, is quite likely to have stimulated the children’s engagement.

Additionally, the results of this study suggest that children's knowledge is related to how they engage in the different camp activities, which is influenced by the delivery of camp educators. When the delivery of the camp educators is more dynamic and interactive, the children appeared more engaged and results indicate they learned more.

**Camp educators' knowledge of related sciences and the core program ideas**

Camp educators’ knowledge of related sciences and understanding of the core program ideas were found to be one of the factors influencing children's knowledge. These enhance the camp educator's delivery and help shape the scope of the conveyed messages because educators are more confident about what they want the children to learn (Table 3.6 and Table 3.7). A lack of understanding of core program ideas may result in a wrong idea or a wrong direction in conveying the camp messages.

In the interviews described in Chapter 3, almost all of the camp educators reported that they have a background in related sciences (Table 3.4). At Perth Zoo camp (Chapter 4), camp educators who had a background in related sciences appeared to be more confident in discussing details about wildlife with the children. At SERS camp (Chapter 5), all of the camp educators had a background in related sciences (Table 3.5) and all were confident
discussing environmental issues and conservation with the children. Mind maps from the Perth Zoo camps and survey results from the SERS camp confirmed that the children learned about animals and conservation at the camps (Table 4.10 and Figure 5.12). These findings suggest that a background in related sciences gave camp educators more confidence discussing the topics. As a result, children learned more from them. However, the camp educators who did not have background in related sciences, but had past experiences related to animals, also performed their tasks well due to their knowledge of animals from past experiences. In this case, having a background in a related science was useful, but not necessary, for performing their tasks.

Being knowledgeable about topics helps the camp leaders to perform their tasks with confidence. In this study, camp educators’ knowledge was gained from their educational backgrounds in related sciences or past experiences related to the animals. However, camp educators can also gain knowledge from professional training (Fien & Rawling, 1996). Professional training can help educators become more competent in performing their tasks (Ferreira et al., 2013) and keeping audiences happy (Ham, 2004). Thus, ensuring that camp educators have related knowledge and receive pre-camp training are useful methods of increasing children's knowledge.

Content relevance

The case studies in Chapters 3 and 4 suggested that the content relevance of activities was vital for supporting children’s learning. At Perth Zoo camp (Chapter 4), the observations showed high scores of content relevance in each activity (Table 4.5) which means that the camp activities were directly relevant to the core program messages. Examination of the children’s mind maps indicates that the children learned about types of animals, habitats, animal behaviour, conservation, zoo/wildlife sanctuaries, and enrichment (Table 4.1). Comparing the camp activities with what the children reported learning showed a
correlation between the two. Half of the activities at SERS camp received low scores for content relevance which means that half of the camp activities were less relevant to the camp core program messages. This affected children's learning. Only 5% of the children reported that they learned about conservation which was the main purpose of the SERS camp. This may be because the children considered conservation to be water conservation as they were taught about water conservation in Activity 2 and 3. The children did not connect the conservation aspect with wildlife. So, understanding that content relevance of activities is likely to enhance children's knowledge can open a door for improving the communication of biodiversity and wildlife conservation to Thai children. Explicit program messages will help reinforce understanding.

6.3 Development of a model for communicating biodiversity and wildlife conservation for Thai children

A model for communicating biodiversity and wildlife conservation to Thai children has been developed using the findings of this study. This involved integrating lessons about the effective and ineffective aspects of Perth Zoo camp and SERS camp, interviews with the camp educators and findings from the literature. The purpose of creating this model is to help program planners in Thailand understand what needs to be considered to foster meaningful outcomes from their programs and improve the long-term impact of their programs.

Development of the model

A model for communicating biodiversity and wildlife conservation for Thai children is developed here in two phases (Figure 6.1). The first phase integrates the findings from this study. It shows that camp educators’ delivery and the relevance of activities were important in enhancing children’s engagement. However, camp educators and activities
need to have certain characteristics in order to foster children's engagement. Camp educators need to be highly engaged in their tasks, knowledgeable about related sciences and the core program message, and able to interact enthusiastically with children. These things are essential characteristics of a camp educator. Camp activities must be enjoyable, interactive, and support the program messages or main objectives. This study confirmed the importance of these characteristics for enhancing children's engagement. Engagement influences knowledge (Klem & Connell, 2004; Reyes et al., 2012), positive attitudes (Eagles & Muffitt, 1990), and awareness about biodiversity and wildlife conservation (Aguirrebierschowsky et al., 2012). Because children's drawings and mind maps were found to be an appropriate evaluation method in this study, their use is suggested for evaluating the impact of a camp on children's knowledge, attitudes, and awareness about biodiversity and wildlife conservation.

The outcome of the first phase does not assure children's pro-environmental behaviour or their stewardship as it does not guarantee a long-term impact on children due to the complexity of factors influencing behaviour (Longnecker, 2016). Creating pro-environmental behaviour is a long-term, uncertain process (Gifford & Nilsson, 2014; Kollmuss & Agyeman, 2002; Norgaard, 2009). According to the Theory of Planned Behaviour (TPB), pro-environmental behaviour can be predicted by an individual’s intention and is based on their knowledge, attitudes, and intention (Ajzen, 1991). Campaigns that aim to provide knowledge, persuasive messages, and encourage positive awareness contribute to an individual’s behaviour change (Abrahamse & de Groot, 2013; de Groot, Abrahamse, & Jones, 2013). The second phase of the model suggests follow-up activities in order to foster pro-environmental behaviour and stewardship in Thai children through reinforcement of a pro-environmental identity (Longnecker, 2016). The TPB, related literature, and knowledge gained during conducting this study were used to develop this second phase.
The TPB is useful for defining responsible environmental behaviour in many studies (Fielding, McDonald, & Louis, 2008). According to the TPB, strong intentions predict an individual’s behaviour and the intentions of an individual are influenced by three factors: attitudes toward behaviour, a subjective norm, and perceived behavioural control (Ajzen, 1991). Attitudes toward behaviour are determined by positive or negative personal values (Fielding et al., 2008). A subjective norm is an individual's perception of particular behaviour as it is influenced by people around them (Fielding et al., 2008). Perceived behavioural control is the individual's belief in their own ability to perform a particular behaviour (Ajzen, 1991).

Perceived behavioural control is an important factor in the TPB as an individual’s behaviour can be influenced directly by perceived behavioural control which results in a prediction of the particular behaviour (Ajzen, 1991). Perceived behaviour control results from personal experiences and advice from others (Ajzen, 1991). Therefore, the TPB was employed as an appropriate theoretical framework for creating a long-term impact from the camp and enhancing pro-environmental behaviour or stewardship in Thai children.

Knowledge, positive attitudes, and awareness of biodiversity and wildlife conservation were the results from the first phase of the model which contribute to children’s perceived behavioural control. Additionally, an environmentally responsible subjective norm can be fostered to stimulate children’s intention of pro-environmental behaviour.
Figure 6.1 A model for communicating biodiversity and wildlife conservation for Thai children.
A subjective norm is a social norm which indicates the social influence or acceptance of a behaviour among particular members of a society important to the individual (Cialdini & Goldstein, 2004). Social norms also have direct influence on people’s guilt and moral development (Bamberg & Möser, 2007). People tend to follow social norms to avoid social exclusion (Bamberg & Möser, 2007). According to Bamberg & Möser (2007), awareness of environmental issues is important but insufficient to influence pro-environmental behaviour. Instead, social norms and personal values contribute to pro-environmental behaviour (Longnecker, 2016). To consolidate social norms, follow-up activities and networking after the camp should be provided.

Social media is widely used by young people to interact outside schools (Mazman & Usluel, 2010; Prescott, Wilson, & Becket, 2013; Selwyn, 2007). It has been successfully used for conservation-related groups such as the New Zealand Garden Bird Survey (https://www.facebook.com/groups/nzgardenbirdsurvey/). Follow-up activities using social media might establish subjective norms and perceived control of biodiversity and wildlife conservation behaviours. Social media has been used for educational purposes such as communication, collaboration, and resource or material sharing (Mazman & Usluel, 2010; Wang, Woo, Quek, Yang, & Liu, 2012). Thus, it is a potential tool for promoting interaction between students, especially for communication and announcements (Browning, Gerlich, & Westermann, 2011; Wang et al., 2012). Recently, Facebook has been used successfully for delivering a social norm intervention to reduce problem drinking at a university (Ridout & Campbell, 2014). Facebook is currently widely used among Thai children who attend camp at SERS and the children exchanged their Facebook accounts among themselves and with camp educators. As a consequence, Facebook could be an appropriate tool to present fun and interactive follow-ups with activities such as quizzes or photo contests. By providing relevant follow-up activities, a new subjective norm about biodiversity and wildlife conservation could be developed.
among these Thai children. Opportunities for networking would enable camp participants to develop their pro-environmental identities and become advocates and to help spread pro-environmental attitudes more widely.

Networking should enhance the development of a subjective norm about biodiversity and wildlife conservation. As more organizations become involved, the events and activities carried out will reach more children and others in the public. More series of events and activities would help deliver a new subjective norm about biodiversity and wildlife conservation. Schools could be the first participants because they already provide children’s education. Schools can help by disseminating messages on biodiversity and wildlife conservation from SERS camp at their schools. Zoos are also potential participants because they facilitate children seeing and learning about wildlife without going into the wild. Most of the zoos in Thailand are working on breeding programs which could help children learn more about this aspect of conservation as well as damaging effects of wildlife trading.

The World Wide Fund for Nature Thailand (WWF Thailand) is another potential participant in the network as a part of the international World Wide Fund for Nature (WWF) organization, which is known as a world-leading independent conservation organization. WWF Thailand was officially established in 1995 and has played a major role in Southeast Asia’s conservation since then. Members of WWF Thailand come from various educational backgrounds but are all passionate about engaging and inspiring the public about conservation. Their projects saving local endangered species such as elephants and tigers are recognized among Thai people and have been supported by government agencies (WWF Thailand, 2010). In 2015, they ran a campaign of Chor Chang Can Save Elephants (http://www.chorchang.org/en), asking people through social media and websites to remove a common letter in the Thai alphabet (Chor Chang: ช) that relates to elephant
(Chang) from their names. The purpose of the campaign was to increase awareness among Thai people about the importance of elephants (things would not be the same for Thai people if all Chor Chang were missing) and saying "no" to ivory trade-related killing of elephants. This campaign created a huge new norm against ivory trading through Thai social media (https://www.youtube.com/watch?v=PvnBmb0FT9Y) and ivory trading issues became a top priority of the Thai government. With their professional expertise and credibility in Thailand, WWF Thailand would be helpful in creating a meaningful series of events, as with the Chor Chang Can Save Elephants campaign, and developing a new subjective norm among Thai children. For example, the children from SERS camp could participate in the next WWF campaign or volunteer to help promote WWF campaigns at schools if there was collaboration between SERS camp, WWF, and schools. Being a part of a WWF campaign would contribute to children's appreciation of wildlife and of what they can do help wildlife and the environment, which will enhance children's intentions to commit to pro-environmental behaviour. It would also help them become advocates among their peers, spreading the impact of the SERS camp beyond the actual participants.

**Implementation of the model**

The model proposed here for communicating biodiversity and wildlife conservation is designed to be implemented at the SERS camp by TISTR’s Knowledge Centre team. The researcher is a member of the TISTR’s Knowledge Centre team that will be involved in the process of the implementation. Funding for the SERS camp comes from Ministry of Science and Technology as an annual budget. The following sections describe recommended steps for implementing the model.

**The first step**

The recommended first step of implementation is to hold a meeting with previous camp educators about the model to discuss and clarify core program messages. If some of the
previous camp educators are available to continue volunteering, they will be asked to be mentors and trainers for new educators. New camp educators will be recruited from students in related-sciences and faculties of universities in Thailand. Interviews will be used to select enthusiastic and passionate camp educators to ensure the strong delivery seen in previous camps is maintained. After the recruitment process, an induction course will be conducted to make sure that all camp educators are aware of the camp objectives and core program messages to reinforce key messages at the camp. Training will also ensure new educators know how to work with children. Previous camp educators can be asked to share their experiences of what has worked well and what to avoid with children at the camp. Results from Chapters 3 and 4 describing camp educators' delivery will also be used as examples to help point out the importance of camp educators for effective children’s engagement.

The second step

The second recommended step is to revise activities to ensure that all the activities have the preferable characteristics and are relevant to the agreed core program messages. Activities that received high engagement scores at the Perth Zoo camp will be adapted to local practices and adopted at the SERS camp, taking into account available resources and children’s safety. The activities that received low scores in content relevance and children’s engagement at the SERS camp will be removed from the new camp’s program. Activities of the camp must reinforce the core program messages. For example, if increasing children’s awareness of the importance of animal’s habitats is determined to be a core program objective, The Habitat Real Estate activity used at the Perth Zoo camp will be adapted using local animals and their habitats. However, the core program message of the camp can be changed yearly. Wildlife trading and other appropriate uses of wild animals in tourism will be considered as the core program messages, because these are
important fundamental issues in Thailand. Appropriate activities will be created to correlate and be relevant to these core program messages. The activities will be followed up by brainstorming with the children about what they can do in daily life that may help preserve animals’ habitats. Ideas such as reuse and recycle will be introduced to foster individual, feasible behaviour changes.

The third step

The recommended third step is to use surveys and mind maps for evaluation as they revealed meaningful results in this study. Surveys will be designed according to the questionnaires used in Chapter 4. As for mind maps, children will be given coloured pencils and an A3 size piece of paper which have printed words "Wildlife Habitat" (or whatever the theme of the year is) in the centre. This activity will be done both before and after the camp. The same piece of paper will be used both times, but different colours of pencils will be used to differentiate between pre- and post-camp responses. Children will be asked to write or draw everything that they think of related to the theme of the camp. The analysis of the mind maps can be done using thematic coding procedures described in Chapters 4 and 5. The Bag Painting activity described in Chapter 5 will also be used for evaluation. Children will be given instructions on how to use acrylic painting and asked to paint something that reminds them of the SERS camp. Results of the surveys, mind maps and analysis of artwork will give an indication of children’s knowledge and attitudes from the camp.

The fourth step

The recommended fourth step involves creating follow-up activities that reinforce core program messages and increase children’s awareness of how they can help protect endangered species, preserve habitats, and enhance biodiversity. This step can also provide opportunities for children who do not have a chance to attend the camp. At this
step, a collaboration network between schools, zoos, and WWF Thailand will be explored to help create follow-up activities and enhance their uptake by providing a social network for camp participants. TISTR’s Knowledge Centre team will send out official invitation letters to appropriate schools and organizations asking for their collaboration. According to Thai custom, collaboration should start with simple things, such as providing content on the SERS camp’s Facebook page, providing complimentary gifts, sharing content at schools’ notice boards, and sending students to the SERS camp. A simple activity that could have potential to be a first follow-up activity is a quiz via SERS’s Facebook page. For example, the quiz could focus on daily life activities that would help in conservation. This could be reinforced with a photo contest with a theme of reusing and recycling at home or at school. Children who win the competition would receive free passes to zoos that agreed to collaborate. And if the collaboration developed far enough, the members from schools, zoos, and WWF Thailand would be invited to join together to work on bigger follow-up activities similar to the Chor Chang Can Save Elephants campaign.

6.4 Limitations of the study

As in any research, there are limitations of this study. It is worth acknowledging this study’s limitations as lessons for further research. Nonetheless, confidence in the validity of this study’s findings is enhanced by data being collected from different sources using mixed methods.

Time

Time was a factor that limited data collection from the case studies at Perth Zoo camp and SERS camp due to the camps’ fixed schedules. It was not possible to implement the same desired data collection methods in both camps. The researcher had to employ various methods with an aim to collect data for comparison from both camps. For example, it was
not possible to use mind maps at the SERS camp in this study and so thematic coding of artwork was used as an indication of what children were thinking about towards the end of the camp.

**Budget**

As the camps were held in two different countries, the researcher was required to travel for data collection. The budget for traveling was limited which resulted in a small sample size of children in Thailand. The small sample size precluded statistic analysis of the relationship between camp educator delivery and children’s engagement in Thailand. Instead, the researcher used survey results showing children's satisfaction to cross-check with the observation results as satisfaction was used as an indicator of children’s engagement.

**Survey of SERS camp**

The survey questionnaires of the SERS camp were designed by a camp coordinator and had been used for many years. The surveys are part of the International Organization for Standardization's (ISO) official documents. Due to the ISO standardized process, the researcher was not allowed to change them or use her own surveys while conducting this study. Furthermore, the researcher could not access the raw data of the surveys as they were submitted to MOST who funded the camp. The researcher was only allowed to access the camp report and use the camp report for the study. To overcome this limitation, the researcher used methodologies of observation, thematic coding of children's artwork, and thematic coding of answers to open-ended questions from the camp report to gain additional data to that provided by the camp coordinator.
6.5 Suggestions for further study

This study is the first to be conducted on a residential camp about biodiversity and wildlife conservation for children in Thailand. The results of this study have pointed to useful further investigation in many areas. The suggestions for further investigation are:

- Professional training programs for camp educators
  As the findings reinforced the important role of camp educators in influencing children's engagement and children's knowledge, it would be worthwhile to explore the knowledge and skills that educators need to implement activities at the camp and determine if they can be effectively provided through a pre-camp training program.

- Activity and content use at an environmental residential camp
  The findings of this study confirmed that in order to maximise meaningful outcomes, content and activities at the camp are more effective when they are relevant to and reinforce the key messages. Further investigation is suggested to allow the creation of appropriate activities, especially with regard to the cultural context of South-east Asia.

- Pro environmental behaviour of Thai children
  No previous research on pro-environmental attitudes or behaviours of Thai children was found while conducting this study. Further investigation on this topic is recommended in order to determine factors that particularly foster Thai children’s pro-environmental behaviour.

- Roles of schools and parents in Thailand
  The complementary roles of schools and parents in encouraging children to learn about biodiversity and wildlife conservation should be explored. This may have an
influence on retention of the outcomes of the camp and on Thai children's pro-environmental behaviour. It would also be useful to explore whether children can influence their families’ attitudes and behaviour.

- Use of social media in developing a pro-environmental social norm and pro-environmental attitudes and behaviour in Thai children

As social media is widely used among Thai children, there is potential to develop a pro-environmental social norm and pro-environmental attitudes and behaviour among them, as well as potential to influence their families. The research in this area would be used in Thailand to help create a new generation who care about the environment and perhaps influence immediate change in some issues in Thailand.

- Expanding Environmental Camps in Thailand

Since Thailand does not have many environmental camps, the results and the model that were conducted in this study could be used as guidelines to set up more environmental camps in local communities, schools, zoos or others research stations. By developing more environmental camps and appropriate pre- and post- activities for use in classrooms, many more Thai children would have opportunities to learn about environmental issues and develop pro-environmental behaviours.

6.6 Conclusion

This study has contributed by developing a practical model for communicating biodiversity and wildlife conservation to Thai children. This model was based on empirical findings from interviews and case studies. This case study is the first study that I know of which examines an environmental camp in Thailand. For comparison, a successful overnight
camp at Perth Zoo in Western Australia was studied to consider whether components might be incorporated into a Thai camp.

The model that was developed can be applied to other Thai camps as it has potential to foster children's engagement, knowledge, attitudes, and awareness. The suggestions for activities after the camp have the capacity to magnify the effect of this camp so that participants become ambassadors for conservation in Thailand.

Some methods used in this study such as mind mapping and artwork analysis could be adapted and used to assess children's knowledge and reflections in other studies.

Last but not least, this study has opened a new chapter in Thailand's project to save our national treasures by motivating the younger generation to understand and appreciate what we have, and to help save it before it is too late.
References


Ham, S. H., & Weiler, B. (2002). Chapter 3 - Interpretation as the centrepiece of sustainable wildlife tourism. In R. Harris, T. Griffin & P. Williams (Eds.), *Sustainable Tourism* (pp. 35-44). Sydney: Butterworth-Heinemann


Psychiatry, 40(5), 809-818.


Appendix 1: Example of back translation

<table>
<thead>
<tr>
<th>Original data in Thai</th>
<th>English translation</th>
<th>Translated back to Thai</th>
</tr>
</thead>
</table>
| เราคาดหวังให้เด็กได้สนุกกับการได้สัมผัสธรรมชาติ ได้เห็นสัตว์ต่างๆ ว่าเขาอยู่อย่างไร ให้เห็นโลกกว้าง ที่มีมากกว่าตึกрамบ้านช่อง หรือพวกอุปกรณ์เอนเตอร์เทนเมนต์แพงๆ ให้เขามาเห็น 为了让孩子们享受与自然的接触，看到各种动物，看到它们在做什么，看到一个更广阔的世界，而不是高楼或昂贵的娱乐设备，让他们来看看，让他们更了解和意识到野生动物的重要性。

"We want them to enjoy living with nature seeing all kinds of animals so that they know that their world is actually bigger and is not just about tall buildings, high technology and expensive entertainment. This will allow them to better appreciate wildlife".

| ความท้าทายเป็นเรื่องวิธีการประเมินผลที่ดีกว่าเดิม เราใช้แบบสอบถามความพึงพอใจโดยรวมแต่เรายังไม่มีแบบประเมินผลก่อนและหลังอย่างเป็นทางการที่ใช้กันอยู่ ตอนนี้เรายังใช้แบบประเมินผลขอข้อมูลที่เด็กได้รับแต่ผมคิดว่าเราต้องเริ่มคิดหาวิธีการที่ดีกว่าๆเพื่อให้เกิดประสิทธิภาพมากขึ้น "Challenge is to employ a better evaluation. We have questionnaires for an overall satisfaction but we do not yet have a formal pre and post assessments. We currently rely on those questionnaires to improve the camp but I think we need a better way to evaluate our camp."

"Challenge is to employ a better evaluation. We have questionnaires for an overall satisfaction but we do not yet have a formal pre and post assessments. We currently rely on those questionnaires to improve the camp but I think we need a better way to evaluate our camp."

| ต้องการให้เด็กๆได้รับการเรียนรู้ที่หลากหลาย เหมาะสมกับเด็กแต่ละคน ผู้นำค่ายต้องทำให้การสอนเป็นสิ่งสนุกสนานและมีประสิทธิภาพ เพื่อให้เด็กๆประทับใจและสามารถจัดเวลาเรียนรู้ที่ได้รับจากค่ายได้อย่างมีประสิทธิภาพ "I think we have to see what resources are available to us and choose activities that encourage students to play active roles rather than merely concentrate on lectures. The camp leader must be able to make education enjoyable and productive. They have to be well trained in order to facilitate all kinds activities so that the students are impressed and will able to assimilate concepts effectively."

"I think we have to see what resources are available to us and choose activities that encourage students to play active roles rather than merely concentrate on lectures. The camp leader must be able to make education enjoyable and productive. They have to be well trained in order to facilitate all kinds activities so that the students are impressed and will able to assimilate concepts effectively."

"I think we have to see what resources are available to us and choose activities that encourage students to play active roles rather than merely concentrate on lectures. The camp leader must be able to make education enjoyable and productive. They have to be well trained in order to facilitate all kinds activities so that the students are impressed and will able to assimilate concepts effectively."

"I think we have to see what resources are available to us and choose activities that encourage students to play active roles rather than merely concentrate on lectures. The camp leader must be able to make education enjoyable and productive. They have to be well trained in order to facilitate all kinds activities so that the students are impressed and will able to assimilate concepts effectively."
Appendix 2: Pre- and post-surveys for children at Perth Zoo Camp

School Code_____

Questionnaire for use with students before attending Perth Zoo Camp

1. Male            Female

2. Which year are you in at school?
   3   4   5   6   7

Please read each of following questions, and think about your answer. There is no single, correct answer. Just circle the answer that best describes your feeling for each question.

3. I am excited about going to Perth Zoo Camp.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

4. Wildlife conservation is important to me.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

5. My lifestyle has an impact on wildlife conservation.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

6. I want to help protect wildlife.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

7. I know a lot of things I can do to help wildlife.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

8. It is not my responsibility to fix up problems with wildlife conservation.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

9. Adults listen to my opinions.
   Strongly disagree  Disagree  Agree  Strongly agree  Unsure

10. I want to learn more about wildlife conservation.
    Strongly disagree  Disagree  Agree  Strongly agree  Unsure
Questionnaire for use with students after attending Perth Zoo Camp

1. Male     Female

2. Which year are you in at school?
   3      4      5      6      7

Please read each of following questions, and think about your answer. There is no single correct answer. Just circle the answer that best describes your feeling for each question.

3. Wildlife conservation is important to me.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

4. My lifestyle has an impact on wildlife conservation.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

5. I want to help protect wildlife.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

6. I know a lot of things I can do to help wildlife.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

7. It is not my responsibility to fix up problem with wildlife conservation.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

8. Adults listen to my opinions.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

9. I want to learn more about wildlife conservation.
   Strongly disagree     Disagree     Agree     Strongly agree     Unsure

Please read the following question, and think about your answer. Then write down your the answer.

10. What is the most important thing you have learned at Perth Zoo Camp?
    ____________________________________________________________________
    ________________________________________________________
Appendix 3: Observation sheets for Perth Zoo and SERS camps

Camp Detail

<table>
<thead>
<tr>
<th>Observer code:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Camp Code:</td>
<td>School code (Perth Zoo Camp ONLY):</td>
</tr>
<tr>
<td>Number of teachers/carers:</td>
<td>Number of Children:</td>
</tr>
<tr>
<td>Number of Camp Educator:</td>
<td>Children school year:</td>
</tr>
</tbody>
</table>

Observation Sheet Scoring:

Observation are scored on a scale from 1 to 5 with the following general meanings:

1 = Poor; 2 = Fair; 3 = Satisfactory; 4 = Good; 5 = Excellent

<table>
<thead>
<tr>
<th>Duration (minute)</th>
<th>Activity</th>
<th>Content relevance</th>
<th>Children's engagement</th>
<th>Camp educator's delivery</th>
<th>Note</th>
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</table>
Appendix 4: Coding sheet of open-ended survey at Perth Zoo camp

What is the most important thing you have learned at Perth Zoo camp?

<table>
<thead>
<tr>
<th>Children's response</th>
<th>Conservation awareness</th>
<th>Animal</th>
<th>Behaviour</th>
<th>Enrichment</th>
<th>Role of modern zoo</th>
<th>Friendship</th>
<th>Others</th>
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</table>
Appendix 5: Mind map coding sheet

Mind Map coding sheet

<table>
<thead>
<tr>
<th>School code</th>
<th>Main theme</th>
<th>Link</th>
<th>Sub-theme category</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
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<td>Types of animal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Habitat</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Conservation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Enrichment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zoo/Wildlife sanctuary</td>
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<tr>
<td></td>
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<td></td>
<td>Definition</td>
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<tr>
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<td>Animal behaviour</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>The student's attitudes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Others</td>
</tr>
</tbody>
</table>

Wildlife

Biodiversity
สรุปใบสอบถาม

โครงการถ่ายทอดความรู้วิทยาศาสตร์และเทคโนโลยีสำหรับเยาวชน :

การใช้ประโยชน์เชิงอนุรักษ์ความหลากหลายทางชีวภาพของพื้นที่สะแกราช ครั้งที่ 13

วันที่ 27 – 29 เมษายน 2555 ณ สถานีวิจัยสะแกราช

(จำนวนเยาวชนที่เข้าร่วมโครงการ 53 คน จำนวนเยาวชนที่ตอบแบบสอบถาม 49 คน : หญิง 28 คน คน 21 คน)

1. น้อง ๆ พอใจ/ชอบใจแค่ไหนในเรื่องต่อไปนี้ (ใส่เครื่องหมาย √ ลงในช่องว่าง)

<table>
<thead>
<tr>
<th>รายการ</th>
<th>ระดับความพึงพอใจ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. รถบัสไป - กลับ</td>
<td>57.14</td>
</tr>
<tr>
<td>2. อาหาร (อาหารหลักแต่ละมื้อ, ขนม)</td>
<td>71.43</td>
</tr>
<tr>
<td>3. ที่พัก ที่นอน</td>
<td>53.06</td>
</tr>
<tr>
<td>4. ที่เลือก / เจ้าหน้าที่</td>
<td>85.72</td>
</tr>
<tr>
<td>5. กิจกรรมสันทนาการ เที่ยว เพลง</td>
<td>79.59</td>
</tr>
<tr>
<td>6. กิจกรรมกันน้ำในน้ำ</td>
<td>53.06</td>
</tr>
<tr>
<td>7. กิจกรรม ร้องเพลงร้องเพลงอย่างง่าย ๆ ชั้น 5</td>
<td>61.22</td>
</tr>
<tr>
<td>8. กิจกรรมดูตัวตู้ &amp; ดูแมลงน้ำทะเลพื้นที่</td>
<td>57.14</td>
</tr>
<tr>
<td>9. กิจกรรม ดูตัวตู้ &amp; ดูแมลงน้ำทะเลพื้นที่</td>
<td>73.47</td>
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<tr>
<td>10. กิจกรรมการแสดงขึ้นที่พักน้ำ</td>
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<tr>
<td>11. กิจกรรมแสดงน้ำ</td>
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</tr>
<tr>
<td>12. กิจกรรมแสดงน้ำ</td>
<td>71.43</td>
</tr>
<tr>
<td>13. กิจกรรมดูตูน</td>
<td>61.22</td>
</tr>
<tr>
<td>14. กิจกรรมเพื่อนของฉัน</td>
<td>57.14</td>
</tr>
</tbody>
</table>

2. สิ่งที่น้อง ๆ ประทับใจที่สุด (ที่อยากอยากให้เราทำเป็นคำพูด)
- ประทับใจโครงการสันทนาการและแสดงน้ำทะเลพื้นที่
- การได้รู้จักพื้นที่ใหม่
- กิจกรรมที่ 12 เป็นกิจกรรมที่สนุกมาก รู้สึกเหมือนปล่อยตัวเองไปชิมคว้า 10 นาที
- พบกิจกรรมการแสดงน้ำทะเลพื้นที่
- ดูตูน
- ประทับใจการแสดงน้ำทะเลพื้นที่
- ดูตูน
- เดินป่า
- อาหารอร่อยมาก
- กิจกรรมดูดุ๊ด$search_result_text_1020275565[1] นักเลี้ยง
d
ได้เรียนรู้ว่าที่นี่มีสัตว์ที่ไม่ค่อยได้ทำให้เราได้ความรู้เพิ่มขึ้น
ได้รู้จักเพื่อนใหม่ เป็นผู้ใหญ่มากขึ้นเพราะต้องดูแลน้อง ๆ มีความสามัคคี
เดินป่าตอนกลางคืน เห็นแมลงแปลก ๆ ได้มิตรภาพค่ะ
ความรู้
ได้พบเพื่อนใหม่ ๆ และความรู้ใหม่ ๆ
การดูดาว ศึกษาธรรมชาติต่าง ๆ ได้ไปพักผ่อน
ดูสัตว์ ได้รู้จักเพื่อนใหม่ ๆ
รู้จักดูแลตัวเอง
ได้รู้จักดูแลตัวเอง
ได้รู้ว่ากว่าจะได้น้ำมันส่วนมาก
เดินป่า
รู้จักการพึ่งตนเอง
ได้เดินป่าความอดทน
ความสามัคคี
ได้มีเพื่อนเพิ่มขึ้น ได้รู้เรื่องปัญหาต่าง ๆ
ได้รู้เรื่องสัตว์
ทาให้รู้จักการประหยัดน้ำ
ได้พบแก้วน้ำที่ทำจากขวดน้ำอัดลม
การใช้ชีวิตโดยพึ่งตนเอง
ไปลูก ไปกีฬาพยาeba
รู้จักเด็กด้วย
เรียนรู้สิ่งใหม่ ๆ
การเดินป่าต้องทำอย่างไร
การรู้จัก การรู้การดูแลน้ำ
การรู้จักน้ำว่ามันเหนื่อยแค่ไหนกว่าจะได้น้ำแต่ละหยด
ได้รู้เกี่ยวกับชีวิตตอนกลางคืน
การรู้จักน้ำ ความสามัคคี เจอกับพญาพา
ความสามัคคี ความรู้ใหม่ ๆ
การรู้จักน้ำและความสามัคคีและรู้จักเพื่อน ๆ มาถึง
ฝึกความรับผิดชอบ ฝึกการเข้าหาสมาชิก
ได้เรียนรู้ธรรมชาติและควบคุม
ได้รู้จักกับน้ำมากขึ้น ได้ชิมผลไม้จากน้ำ
การเดินป่าต้องทำอย่างไร
การรู้จักกับน้ำมากขึ้น ได้ชิมผลไม้จากน้ำ

4. ข้อเสนอแนะ หรือสิ่งที่ต้องการปรับปรุง
- หอพักหญิงห้องสุดฝั่งขวา มีแมลงห้องน้ำขาด (มดตรึม) ช่วยซ่อมด้วยนะคะ
- ที่นอนมดเยอะ (มันอยู่แถวพื้นและในห้องน้ำและอยู่บนเตียงห้อง 1026)
- การเดินป่า และดูน้ำ น้ำจะต้องเย็น
- ที่นอนมดเยอะ
- ผ้าห่มสั้นเกินไปครับ
- อยากให้ห้องพักมีห้องน้ำในห้อง
- รถบัสควรเปิดหนังเรื่องที่ดีกว่ามวยปล้๊า
- ห้องนอนมดเยอะมาก
- อยากให้บริการน้ำดื่มที่สะอาด
- อยากให้รู้จักดูแลตัวเอง
5. โดยภาพรวมแล้วน้อง ๆ ให้คะแนนการเข้าค่ายครั้งนี้เป็นเท่าไร

<table>
<thead>
<tr>
<th>ระดับ</th>
<th>คะแนน</th>
</tr>
</thead>
<tbody>
<tr>
<td>ดีมาก</td>
<td>75.51 %</td>
</tr>
<tr>
<td>ดี</td>
<td>22.45 %</td>
</tr>
<tr>
<td>พอใช้</td>
<td>2.04 %</td>
</tr>
<tr>
<td>ควรปรับปรุง</td>
<td>0.00 %</td>
</tr>
</tbody>
</table>

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English translation

Title of the project: Dissemination of biodiversity and conservation knowledge of Sakaerat Biosphere Reserve to Thai Youth.

Date: 27th - 29th April 2012

Place: Sakaerat Environmental Research Station, Nakhon Ratchasima, Thailand

Number of Children: 53 (from various schools in Bangkok, Thailand)

Number of Participant: 49 (28 girls and 21 boys)

1. How much do you like the facilities and activities at the camp?

<table>
<thead>
<tr>
<th>List of facility and activity</th>
<th>Extremely satisfied</th>
<th>Very satisfied</th>
<th>Somewhat satisfied</th>
<th>Slightly satisfied</th>
<th>Not at all satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transportation</td>
<td>57.14%</td>
<td>30.61%</td>
<td>12.25%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Food</td>
<td>71.43%</td>
<td>20.41%</td>
<td>8.16%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Accommodation</td>
<td>53.06%</td>
<td>30.62%</td>
<td>10.20%</td>
<td>6.12%</td>
<td>-</td>
</tr>
<tr>
<td>4. Camp leader</td>
<td>85.72%</td>
<td>10.20%</td>
<td>2.04%</td>
<td>2.04%</td>
<td>-</td>
</tr>
<tr>
<td>5. Welcome Ceremony</td>
<td>61.22%</td>
<td>38.78%</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>6. Where Did the Water Come From?</td>
<td>53.06%</td>
<td>40.82%</td>
<td>6.12%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7. Water Story Rally</td>
<td>61.22%</td>
<td>32.66%</td>
<td>6.12%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8. Stargazing and Bug Trapping</td>
<td>57.14%</td>
<td>28.57%</td>
<td>12.25%</td>
<td>-</td>
<td>2.04%</td>
</tr>
<tr>
<td>9. Bird Watching and Finding Siamese Fireback Pheasant</td>
<td>73.47%</td>
<td>22.45%</td>
<td>4.08%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10. Hiking</td>
<td>69.39%</td>
<td>24.49%</td>
<td>6.12%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11. Bag Painting</td>
<td>65.31%</td>
<td>30.61%</td>
<td>4.08%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12. Show</td>
<td>71.43%</td>
<td>16.33%</td>
<td>12.24%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13. My Friend</td>
<td>57.14%</td>
<td>30.61%</td>
<td>10.21%</td>
<td>2.04%</td>
<td>-</td>
</tr>
<tr>
<td>14. Ice-breaking Games</td>
<td>79.59%</td>
<td>18.37%</td>
<td>2.04%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

2. During your stay at the camp, what are the impressions you get from the camp?

- I enjoyed watching stars and bugs trapping at night. It was fun.
- Food.
- I like food, the place and the camp leaders.
- Making new friends at the camp.
- I like acting in the show. I felt like I was a different person for 10 minutes. I really enjoyed acting.
- Hiking and bag painting were impressive activities.
- Finding Siamese Fireback pheasant was the best, especially if I had see female ones.
- Bird watching.
- Hiking and the cool weather in the forest was nice and I learning a lot of things.
- Watching stars and bugs trapping.
- Hiking.
- The food was very yummy.
- Being at the camp was fun. I will come back again next year if I don’t have exam during that period.
- I love all the shows from the camp leaders. I love watching stars at night. I love to see Siamese Fireback pheasant, Thailand’s National Bird.
- I was impressed by everything at the camp, especially the camp leaders and all my new friends.
- The shows.
- Acting activity
- Bag painting.
- Stars watching and bugs trapping.
- I like the shows at night but the most enjoyable activity was “My Friend”.
- Hiking.
- Hiking.
- I like the fire twirling show and the contact juggling show by the camp leader.
- Getting close to the Siamese Fireback pheasant was awesome.
- Bird watching and finding Siamese Fireback pheasant.
- I like painting the bag the most.
- The camp leaders were so kind. The food was good. All the activities were fun.
- Hiking.
- All the activities were impressive.
- Hiking.
- It was extremely fun.
- Hiking. I love it when I saw the native wildlife.
- Hiking.
- Siamese Fireback pheasant.
- The fire twirling show.
- I like all the shows at night.
- Transportation.
- The camp leaders were smart. I learned a lot from them.
- I like the shows.
- The camp leaders took good care of us.
- I love painting the bag at the camp. It was fun.
- ‘My Friend’ activity was fun and scary at the same time.
- The shows.
- I enjoyed watching stars and hiking. The food was also very yummy.

3. What have you learned from the camp?
- I learned more about science.
- Hiking.
- I had some experience in hiking.
- I learned to wake up early in the morning.
- I had some experience in hiking and testing edible things in the forest.
- I learned to make new friends.
- I learned about teamwork which is the same as what I had learned last year at the camp.
- How to paint with acrylic paint.
- I learned about bird spices.
- I learned about local wildlife.
- I learned about bugs.
- I learned how to survive in the forest.
- I learned about where the water comes from.
- I learned more about wildlife and biodiversity.
- I have learned to make new friends and learned to take care of young children, which made me feel grown up.
- I learned about the nocturnal bugs and friendships.
- Knowledge.
- I learned about the stars, biodiversity and Siamese Fireback pheasant.
- I learned about how to make the most of my spare time.
- Knowledge and friendships.
- I learned to take care of myself.
- I learned to rely on myself.
- I learned about patience, honesty and responsibility.
- I learned about water and realised that it was not easy to process the water and distribute it to our houses.
- I learned about hiking.
- I learned about self-reliance.
- I learned about endurance.
- I learned about teamwork.
- I learned about different types of forest.
- I learned about local animals.
- I learned about energy saving and I want to save more energy at my house.
- I learned how to reuse the soft drink cans.
- I learned about self-reliance.
- I learned about Siamese Fireback Pheasant and the local birds.
- I learned about the stars and the local birds.
- I learned about hiking.
- I learned about bugs and water cycle.
- I learned about water processing and water conservation.
- I learned about biodiversity.
- I learned about water cycle, Siamese Fireback Pheasant and teamwork.
- New knowledge and teamwork.
- I learned about self-reliance, teamwork.
- Be responsible and be socialise.
- I learned about nature and star.
- I learned more about water and edible wild fruit.

4. What is your suggestion or comment for improving the camp?

- Need to fix the insect screen in girl’s room. There were so many ants too.
- There were so many ants in room 1026.
- Need air conditioning in very room and the water in the water cooler should be cold.
- There are so many ants on my bed.
- There are so many ants in the accommodation.
- I want the camp to be more fun.
- More movies on the bus instead of WWE wrestling matches.
- There are so many ants in the bedroom.
- The bedroom should have a toilet inside.
- The bus driver should drive faster.
- The blanket is too small.
- Air conditioning must be in the bedroom.

5. How much were you satisfied with the camp?

<table>
<thead>
<tr>
<th>Satisfied Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely satisfied</td>
<td>75.51%</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>22.45%</td>
</tr>
<tr>
<td>Quite satisfied</td>
<td>2.04%</td>
</tr>
<tr>
<td>Unsatisfied</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
## Appendix 7: Coding sheet for children's artworks on calico bags at the SERS camp

<table>
<thead>
<tr>
<th>Artwork number</th>
<th>Conservation</th>
<th>Animal</th>
<th>Nature</th>
<th>Human coexist with nature</th>
<th>Animal and habitat</th>
<th>Camp activity</th>
<th>Unrelated</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
Appendix 8: Coding sheet for children's responses to survey question: "What are the impressions you get from the camp?"

<table>
<thead>
<tr>
<th>Children's responses</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facilities</td>
</tr>
<tr>
<td></td>
<td>Socialisation</td>
</tr>
<tr>
<td></td>
<td>Outdoor activities</td>
</tr>
<tr>
<td></td>
<td>Indoor activities</td>
</tr>
</tbody>
</table>
Appendix 9: Coding sheet for children's responses to survey question: "What have you learned from the camp?"

<table>
<thead>
<tr>
<th>Theme</th>
<th>New experiences or skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reliance</td>
<td></td>
</tr>
<tr>
<td>Socialisation</td>
<td></td>
</tr>
<tr>
<td>Conservation</td>
<td></td>
</tr>
<tr>
<td>Animal</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td></td>
</tr>
</tbody>
</table>

Children's responses