A Study of Informal Science Learning at Taipei Zoo

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ABSTRACT

The major purpose of this study is to explore informal science learning at Taipei zoo. A total of 1233 participants involved in this study. Learning activities include classroom discussion on the topics of animals and biodiversity issues, and a one day field trip to the Taipei zoo. Instruments used were questionnaire of participants’ learning at Taipei zoo and study sheets. Results of the study were as follows: 96.2% of participants were satisfied with the field trip, 51.6% obtained a greater understanding on animals and 49.6% on biodiversity, and 52.7% were willing to re-visit the Taipei zoo in the near future. These results indicated that the learning settings integrated with zoo resources and biodiversity issues has significant influence on participants.

Keywords: biodiversity, field trip, informal science learning, science education, zoo

INTRODUCTION

In recent years, the trend of the world’s science education reform has focused on hands-on and minds-on science learning. In addition, informal science education (also called as free-choice science learning) has received much attention for improving learners’ science learning (Falk & Dierking, 2011; Kelly, Stetson, & Powell-Mikel, 2002; Knapp, 2000; Pugh & Bergin, 2005). Zoos and other informal science education sites can provide learners with different learning opportunities and experiences. Lind (1995) indicated that a trip to a zoo can be a terrific way for young learners to learn about animals, especially using planned learning experiences. Teaching activities at a zoo allow learners to develop knowledge about animals and environmental awareness in a safe environment while fostering the development of social skills (Pringle, Hakverdi, Cronin-Jones, & Johnson, 2003).

Anderson, Thomas, & Ellenbogen (2003) pointed out that learning experiences outside school should be understood and fully appreciated by science educators. Kisiel (2006) argued that most teachers struggle with finding a way to connect that learning with their classroom curriculum. Some strategies have been used by teachers and science educators to help learners’ learning at zoos, but much more efforts should be done for the teaching and learning at zoos.

The year 2010 is proclaimed by the United Nations as the International Year of Biodiversity (Taiwan Biodiversity Information Network, 2009). It is a celebration of life on earth and of the value of biodiversity for our lives. The main theme is biodiversity is life, biodiversity is our life. A zoo is a wonderful place with rich educational resources to allow learners to explore the natural world and promote development of concepts about animals, ecology, and biodiversity. Young learners’ scientific learning and science inquiry should begin in the zoo.

PURPOSE OF THE STUDY

The major purpose of this study is to explore informal science learning at Taipei zoo by integrating zoo resources and biodiversity issues into learning activities.
LITERATURE REVIEW: SCIENCE LEARNING AT THE ZOO

In recent years, the trend of the world’s science education reform has focused on hands-on and minds-on science learning. In addition, informal science education has received much attention for improving learners’ science learning (Falk & Dierking, 2011; Kelly, Stetson, & Powell-Mikel, 2002; Knapp, 2000; McCoy, McCoy, & Levey, 2007; Pugh & Bergin, 2005; Tofield, Coll, Vyle, & Bolstad, 2003).

Zoo and other informal science education sites could provide students with different learning opportunities and experiences. Lind (1995) indicated that a trip to the zoo can be a terrific way for young children to learn about animals, especially using planned learning experiences. Hofstein & Rosenfeld (1996) further pointed out that integrating the classroom curriculum and the zoo resources can create a better science learning results for young learners. Pringle, Hakverdi, Cronin-Jones, & Johnson (2003) found that teaching activities at the zoo allowed the children to develop knowledge about animals and environmental awareness in a safe environment while fostering the development of social skills.

Anderson, Thomas, & Ellenbogen (2003) pointed out that the learning experiences outside the school should be understand and fully appreciated by science educators. However, Kisiel (2006) argued that most teachers agree that a field trip is an important educational experience for their students, many struggle with finding a way to make it connect with their classroom curriculum. Therefore, much more efforts need to be done for the teaching and learning at the zoo.

Some strategies have been used by teachers and science educators in helping young learners’ learning at the zoo (Henson, 2008; Melber, 2001, 2006; Pasquier & Narguizian, 2006; Patrick, Matthews, Ayers, & Tunnicliffe, 2007; Pringle, Hakverdi, Cronin-Jones, & Johnson, 2003; Summers, 2004; Swanagan, 2000). Summers (2004) indicated that, in order to promote scientific venues for informal science education, teachers should properly prepare before visit the informal science education sites, and using the focus questions to focus children’ attention, through the focus questions to guide young learners in meaningful learning.

Integrated activities in different fields of teaching can also promote the effectiveness of learning at the zoo (Engstrom, Boulton, & Wurzelbacher, 2004; Trainin, Wilson, Wickless, & Brooks, 2005; Tunnicliffe, 2002; Wilcox & Sterling, 2008). Trainin, Wilson, Wickless, & Brooks (2005) combined with observation, care, animals, writing, inquiry activities in their research, results show that the overall animal activity can enhance learners’ motivation, boost interest in learning situations, and strengthen the concept about animal.

The use of role-playing teaching activities has also demonstrated some terrific learning outcomes (Cherif, Verma, & Somervill, 1998; Woroch, Scheuermann, & Haney, 2009). Cherif, Verma, & Somervill (1998) demonstrated that role-playing teaching activities can enhance learners’ creative thinking skills, and to link the implementation of science and everyday life. In addition, the use of learning cycle teaching strategy, also help children to explore animals and to develop a basic life science concepts (Kisiel, 2006; Slack, 2010).

Moreover, to improve learners’ science learning at the zoo Davidson, Passmore, & Anderson (2010) suggests that: (i) in order to empower the effectiveness of teaching during students’ visit at the zoo, teachers should make clear learning objectives about field trip, connect to classroom curriculum, integrate activities of pre-visit and post-visit to reinforce the science learning; (ii) concern for student social interaction characteristics, teachers should allow students to freely form their visiting group to facilitate the group process at the zoo to observe, discuss, study, and have fun from the process of group activities; (iii) teachers should encourage students to enhance students’ motivation and interest during their visit at the zoo.

For the assessment of teaching and learning at the zoo, Lederman & Lederman (2008) argued that if
we wanted learners to learn something, we must teach it and assess it. Lederman & Lederman (2008) suggested that the following multiple methods of assessment can be used for informal science education include: observation, oral tests, writing assignments, presentations, problem solving, planning, home work, team work, interviews, achievement tests, and the portfolio. Other assessment techniques were also recommended by researchers include concept maps, audio-taping conversations, video-clip analysis, discourse analysis, personal meaning maps, semantic networks (Anderson, Lucas, & Ginns, 2003; Davidson, Passmore, & Anderson, 2010; Fisher, 2000; Rennie, Feher, Dierking, & Falk, 2003). Therefore, in order to understand the learning outcomes at the zoo, we should choose appropriate methods of assessment.

METHODOLOGY

A total of 1233 participants involved in this study which includes 439 of 1st graders, 462 of 2nd graders from New Taipei city, and 332 of 4th graders from Taipei city. Teaching activities include classroom discussion on the topics of animal and biodiversity issues, and a one day field trip to the Taipei zoo to allow pupils to gain more insights on biodiversity. Research instruments used were questionnaire of participants’ learning at Taipei zoo and study sheets.

According to the above literature review, activities among pre-visit, during their visit, and post-visit should proper arrange in order to allow learning activities meet the classroom curriculum objectives. During their visit at the Taipei zoo, participants were guided by teachers and volunteer parents from each class to act as leader and assistant to strengthen the participants’ scientific inquiry. Follow-up class study at the post-visit, in addition to continue the discussion of animal themes and biodiversity issues, participants were asked to fill out the questionnaires of learning at Taipei zoo, and study sheets.

The questionnaire consists of eight questions to find out information such as the number of visits to Taipei and other zoos and the participants’ level of their learning at the Taipei zoo. The study sheets have three open-ended questions about their learning of animal and biodiversity conservation at Taipei zoo. The validity of the research instruments were using expert validity which examined by three science education researchers, and research instruments had good validity. Quantitative data were analyzed by frequency procedure; the qualitative data (study sheets and open-ended questions from questionnaire) were performed by triangulation and cross-case inductive analysis (Bogdan & Biklen , 1982; Guba & Lincoln, 1999; Patton, 1999; Silverman, 2000), in order to confirm the reliability and consistency of the data analysis and finding. A total of 1233 copies of the data sets are valid for the study.

RESULTS AND DISCUSSION

Results of Questionnaire Survey at Taipei Zoo

Feedbacks on the questionnaires of learning at Taipei Zoo were collected, analyzed, and stated as following. There are 1233 participants involved in this study. The frequency distribution of gender is presented at Table 1. Tables 2 and 3 show the number of visits to Taipei Zoo and other zoos.

<table>
<thead>
<tr>
<th>Table 1: Total participant by gender</th>
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<tbody>
<tr>
<td>Male</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>1st graders</td>
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<tr>
<td>2nd graders</td>
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<tr>
<td>4th graders</td>
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<td>Total</td>
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From Table 1, 605 of the 1233 participants were males, and 628 were females. The highest frequency of visits to Taipei zoo is between 2 to 6 times for both boys (30.7%) and girls (35.2%) while the lowest is 11 times and above (Table 2). Boys and girls visit Taipei zoo most between 2 to 6 times and very few visit the Taipei zoo more than 11 times. Table 3 shows most boys have not visited the other zoos while most girls also have not visited other zoos.

The results of feedbacks of learning at the Taipei Zoo are presented at Table 4, Table 5, Table 6, & Table 7.
Table 4, 5, 6, 7 show the results of the feedback on the questionnaire at Taipei zoo. It reported 798 participants (64.7%) were strongly satisfied with the visit with only 18 (1.5%) strongly dissatisfied. Both the boys and girls understood about animals (n = 1188, 96.4%) and biodiversity (n = 1167, 94.6%). Only 1.8% boys and 1.8% girls did not understand about animals and 2.6% boys and 2.8% girls did not understand about biodiversity. 52.7% of the boys and girls were willing to re-visit the Taipei zoo again and only 4.1% did not want to re-visit.

Feedback of the open-ended questions on learning at Taipei zoo is reported as follows: many participants expressed positive thoughts on animal conservation concepts, and most expressed satisfaction with the visit and had a lot of fun with good friends. This finding is the same as the result from Davidson et al. (2010). These results indicate that integrating zoo resources and biodiversity issues into teaching activities significantly contributed to the participants’ learning about animals and biodiversity.

**Qualitative Results from Participants’ Study Sheets**

Participants’ study sheets were collected and analyzed. The results are as follows: the top five most popular animals in order were panda (n = 597), penguin (n = 496), elephants (n = 460), koalas (n = 333), and lion (n = 204). In addition to common animals, they also like snakes, guinea pigs, hedgehogs, beetles and all sorts of animals. This finding revealed the animals in favor are consistent with the wide range of species – the concept of biodiversity they have learnt at the Taipei zoo. Several study sheets reflected participants’ understanding of biodiversity conservation and what they would do to care for animals. For example, some stated no to animal abuse, and others, no to buying ivory.

**CONCLUSION**

The results of the study were summarized as follows: (1) 96.2% of participants were satisfied with the field trip to the Taipei zoo, (2) 51.6% of participants obtained a greater understanding on animals, (3) 49.6% of participants had a better understanding on biodiversity, (4) 52.7% of participants were willing to re-visit the Taipei zoo again, (5) the top five species of animals participants like the most were the panda, penguin, elephants, koalas, lion, and (6) participants have been able to demonstrate their strategies in biodiversity conservation. These results indicated that science teaching integrated with zoo resources and biodiversity issues has significant influence on participants of this study.

For a successful informal science education at a zoo, Summers (2004) indicated that teachers should properly prepare before visits to such informal science education sites. They should ask pointed questions to guide students in meaningful learning and integrate activities in different fields of teaching to further promote learning at the zoo effectively (e.g. Engstrom et al., 2004; Wilcox & Sterling, 2008). Furthermore, Trainin et al. (2005) reported the overall activity of observation, care, animals, writing, inquiry activities can enhance students’ motivation, boost interest in learning situations, and strengthen concepts about animals.

To sum up briefly, Davidson et al. (2010) suggests that: (i) in order to empower the effectiveness of teaching during participants’ visit to the zoo, teachers should make clear learning objectives about the field trip, plan activities that connect to classroom curriculum, and include pre-visit and post-visit activities to reinforce science learning, (ii) to ensure participants’ social interaction, teachers should allow participants to freely form their groups to facilitate group work at the zoo, (iii) teachers are to give encouragement to participants to motivate them during their visit at the zoo. Last but not least, Lederman & Lederman (2008) argued for assessment of the learning at the zoo if teachers want participants to acquire some knowledge. They suggested the multiple methods of assessment for
informal science assessment, such as: observations, oral tests, writing assignments, presentations, problem solving, planning, home work, team work, interviews, achievement tests, and keeping a portfolio. Appropriate methods of assessment can be used to evaluate learning outcomes of participants at zoos.

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REFERENCES


