Experiencing biodiversity - the interactive activities at Opel-Zoo Kronberg

Tina Braun, Alexander Popp and Prof. Dr. Paul Dierkes
Bioscience Education, Goethe University, Frankfurt, Germany

Abstract
This paper presents findings of an empirical case study performed at a school that investigated how the interests in biological topics of students develop over time. The results revealed a marked decrease of interest in zoo animals and the engagement of zoos in species conservation with increasing age whereas the interest in conservation biology in general or other biological subjects remained stable or only slightly decreased. These results suggest that zoo visits are especially important in higher classes to keep the role of zoos in conservation biology in mind. Implying that zoo visits provide affective experiences that encourage students for an engagement in conservation topics, this article presents an educational programme developed by Frankfurt University and implemented at Opel-Zoo Kronberg which aims at triggering students’ interest in zoo animals and conservation work at zoos.

Introduction
Several studies proved the important role of zoo visits for student’s science learning (Dierking et al. 2002). Positive experiences motivate people to connect with their environment and to develop a feeling of responsibility for it (Rathunde & Csikszentmihalyi 1993). Millions of different faunal and floral species live on our planet. Today, there are growing concerns about a prominent rise in the extinction rate due to human activities making the conservation of our natural environment with its current species one of the biggest challenges of our time. Together with Opel-Zoo Kronberg, the department for bioscience education at Frankfurt University created an educational programme that aims at motivating school groups to experience and to cherish the biodiversity through the direct dialogue with the zoo staff, interactive hands-on materials and the encounter of zoo animals.

Material and Methods
In an empirical study conducted with 1141 students, the department for bioscience education investigated students’ interest in different biological topics including zoo and conservation issues. The students were asked to rate their personal interest in zoo animals and the work of zoos concerning species conservation, environmental conservation issues, the school subject biology and diverse other topics from the field of human biology. The interviewed students derived from age groups between 11 to 18 years. For the data analysis, the students were grouped in four different age classes and average values on an interest scale from 0 (not interested) to 3 (strongly interested) were calculated.

Results & Discussion
The data clearly show that older students’ interest in topics such as zoo animals or the zoo’s work in species conservation is significantly lower compared to younger age groups and remains consistently low at about the age of 14 to 15 years, whereas other biological topics (e.g. human health) remained unaffected or increase (see Figure 1). Over time, students’ general interest in conservation biology (protecting endangered species or biodiversity) only slightly declined, which may be linked to the similar decrease of interest in the school subject biology.

Frankfurt University and Opel-Zoo Kronberg designed the educational programme "Experiencing Biodiversity at Opel-Zoo Kronberg" to increase awareness of the biodiversity surrounding us and to counteract the decrease of students’ interest in zoo animals and conservation work at zoos. As didactic and psychological research has proved, school field trips can be a vital means for improving children’s learning by giving authentic experiences (Pedretti 1997, Figure 1: Students’ interests in zoo, conservation, human biology and school subject biology (age 11-12: n = 343, age 13-14: n= 299, age 15-16: 252, age 17-18: n = 247; standard deviations varied between 0.67 and 1.07 and error bars were omitted for reasons of clarity).
Dierking et al. 2002). Extracurricular education and out-of-school-experiences belong to the major emphases of teacher education at the department for bioscience education of Frankfurt University. The overall principle is the combination of the theoretical education at university and the practical implementation of this knowledge at out-of-school learning environments. So, the cooperation between university and zoo pursues the mission of reaching both, school groups and student teachers. Only if future teachers have specific application examples they will be able to implement conservation topics in their later classes and thereby promote a profound environmental education at school. In this way visiting Opel-Zoo Kronberg and participating in the programme can be a successful tool to motivate and encourage students from school and university to enhance their interest in zoo animals and conservation work. Figure 2 illustrates the principles of the student teacher education at the department for bioscience education.

Figure 2: the synergy between academic education and practical work in the student teacher training

Within the framework of their academic education at Frankfurt University student teachers can join in the seminar “Biodiversity at Opel-Zoo”. Participants get introduced into the theoretical backgrounds of conservation biology, zoo history and zoo pedagogy and have to design teaching concepts covering different topics of biodiversity which they implement in practise during the days of biodiversity at Opel-Zoo Kronberg (Figure 3). During their conceptual work at university and at the days in the zoo the student teachers get expert advice from university staff as well as from zoo educators. In this way the zoo becomes an informal learning environment for student teachers which enables the realization of action-orientated teaching concepts in the field of environmental education.

The various working stations spread around the zoo area were designed to cover a wide range of age groups and a variety of biodiversity topics. The degree of complexity at each working station is adjustable for the needs of different age groups. Visiting the working station “diversity of apples” younger students can explore the diversity via taste test, whereas older students are informed about genetic differences which lead to different types of fruits. The usage of new media (3D-animations, whiteboards, online-tools, etc.) referring to animals in the zoo aims at particularly attracting students from older age groups and thereby reinforcing their interest in zoo related topics (Figure 4). Further, new digital media enables insights into morphological structures (e.g. carnivore dentition) that are not always visible at the zoo animals. Topics covered at the working stations between the years 2010 to 2014 were among others: genetic diversity of fruits, protection of the oceans, primate tree, importance of honey bees or bat diversity. At the stations, school groups as well as zoo visitors can participate in games, do puzzles and use scientific devices such as binoculars or bat detectors. To support the learning effect during their journey through the zoo visitors get equipped with worksheets and maps at the entrance and every station. One of the highlights was a “climate breakfast” which showed school classes how to reduce carbon dioxide emissions starting with their first meal of the day. This working station refers to our daily lives and aims at the sensitization of ordinary consumer behaviour. The “CITES” station draws the visitors’ attention to the problem of international illegal animal trade and the concomitant threat to various species and ecosystems. The visitor learns how customs works, why certain plant and animal species have to be protected, why certain souvenirs are illegal and what all this has to do with biodiversity. “Getting...
in touch with donkey (*Equus africanus asinus*), goat (*Capra aegagrus hircus*) & co” is possible at the petting zoo (Figure 5). Here, young visitors are invited to acquire a “license” for the petting zoo. They learn how to deal with these domestic animals; get to know their behaviour and hopefully reduce fears of contact.

The programme “Experiencing Biodiversity at Opel-Zoo Kronberg” turned out to be a successful tool for student teachers to gain insights into the conservation work of zoos. They could develop their own ideas through creative work and gain practical experiences which are essential for the later implementation at school. Further, it enabled school groups the direct encounter of zoo animals and showing different facets of biodiversity hopefully generated interest in zoo animals and conservation.

**Conclusions**

Through their decisions children and young adults shape the future of our environment. Therefore, students’ interest in topics as zoo animals and conservation biology needs to be strengthened. With the educational programme “Experiencing Biodiversity at Opel-Zoo Kronberg” school groups can interactively explore wildlife and conservation work and future teachers get equipped with a framework and strategies for a successful implementation at school. In order to rate the success of the programme, case studies investigating in today’s teaching practices of former student teachers are needed. Their experiences can be a helpful tool for the further development of the seminar structure and the programme in the zoo. What can be stated for now is that the cooperation between university and zoo combines the theoretical academic education with the practical work of zoo educators – and this again seems to be a promising and sustainable approach.

Authors contact details:

Tina Braun, braun@bio.uni-frankfurt.de

Paul Dierkes, dierkes@bio.uni-frankfurt.de

**References**

