

Exploring Socio-linguistic Contexts of Children's Learning About Great Ape Conservation in a Zoo

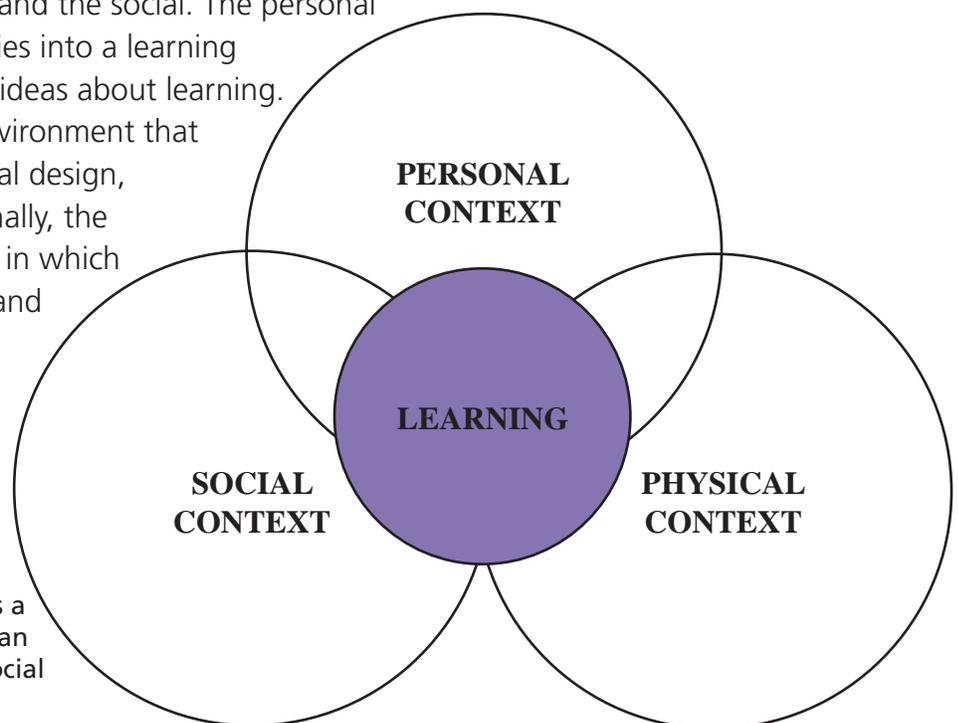
through interpretation and displays, zoos and aquariums aim to educate visitors of all ages and to raise general awareness of conservation issues

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Theory suggests that learning is a complex socio-linguistic process involving many contexts and tools. Using a multi-level methodology to explore learning contexts and tools in great ape conservation education, we found that zoos can empower adults with social and linguistic means to mediate conservation topics to children.

Theoretical Framework

The **Contextual Model of Learning (CML)** is presented within the field of informal science education as a theoretical construct for investigating learning within free-choice settings (Falk and Storksdieck, 2005). CML describes learning as a complex social process situated within three interacting contexts: the personal, the physical and the social. The personal context includes what a person carries into a learning situation, e.g. prior knowledge and ideas about learning. The physical context involves the environment that affects learning, e.g. the architectural design, climate, exhibitions and labeling. Finally, the social context captures myriad ways in which visitors are affected by interactions and collaborations with others, such as other members of their social group or zoo or aquarium staff members.



This model demonstrates learning as a product of the interaction between an individual's personal, physical and social contexts over time.

Contextual Model of Learning

The **Contextual Model of Learning** (CML) provides a large-scale framework for conceptualizing learning, but also includes 12 key factors (Falk and Storksdieck, 2005). Each potentially shapes the learning process in free-choice, informal settings:

Personal Context

1. Visitor motivation and expectations
2. Prior knowledge
3. Prior experiences
4. Prior interests
5. Choice and control

Social Context

6. Within group mediation
7. Mediation by others outside the immediate social group

Physical Context

8. Advance organizers
9. Orientation to the physical space
10. Architecture and large-scale environment
11. Design and exposure to exhibits and programs
12. Subsequent reinforcing events and experiences outside the facility

Inspired by Vygotsky's learning theory, we propose adding two factors:

13. Physical instruments
14. Cognitive tools

Importantly, children's learning involves mediated assistance in order to facilitate the internalization of physical and cognitive tools. The mediation takes place in the form of proximal development where children engage with parents, teachers and more capable peers (Vygotsky, 1978). In a free-choice, informal setting, children learn through social relationships facilitated by their company (typically parents) and guides. Physical and cognitive tools are important learning aids. Learning how to use instruments or other physical aids, and learning new concepts, themes, structures of argumentation and semantic innovations, are crucial to children's cognitive development (Shepardson, 1999; Vygotsky, 1930). We therefore propose including such factors in the CML list.

Methods and Materials

Inspired by the CML as well as the Vygotskian perspective on socio-linguistic learning, we designed a multilevel, mixed methodology for investigating visitors' learning about the scientific idea of animal conservation at Colchester Zoo in Essex. Colchester is one of Britain's, indeed Europe's most recognized zoos, partly due to its commitment to conservation and education. Colchester is not only dedicated to assisting a wide variety of conservation projects worldwide, but also to education, research and the provision of financial and technical assistance to conservationists through *Action for the Wild*, its charitable arm. We chose to limit our investigation to the great ape conservation interpretation and displays in the zoo. We also made a choice to study families visiting Colchester Zoo with children.

Our research methodology is inspired by Falk and Storksdieck (2005), with the addition of particular attention to socio-linguistic mediation within the group and by other outside the group. The method includes:

- Pre- and post-interviews to gauge the personal contexts of learning
- Unobtrusive visitor tracking to observe the social context and the ways in which mediated assistance take place
- Observations in situ of the physical properties of the learning environment
- Personal Meaning Mapping (PMM) to access changes in an individual's concepts and cognitive structures over time

The pre-interviews were designed to probe the visitors' knowledge about the great apes and their views on social learning processes. We asked one adult per family to do a PMM session on great ape conservation and to answer three multiple-choice questions about the great apes. In addition, the respondents rated on a six-point Likert scale statements about their general knowledge of biology, their impact as a parent on their children's learning and the reasons for their visit to Colchester Zoo. In the post-interview, the respondents were provided with the option to modify their responses to the multiple-choice questions and the PMM. Finally, they were asked to rate on a six-point Likert scale statements about display visibility and readability, their level of interactions with staff and the extent to which they explained to their children about the endangered orangutans and chimpanzees.

Results

The research was conducted for four months and involved 56 respondents/families. The most encouraging result was that our respondents did exhibit learning about great ape conservation issues. We found that the proportion of correct answers to the multiple-choice questions about great apes rose from about 50% in the pre-interviews to more than two-thirds in the post-interviews.

Learning was highly specific to the information provided by the Zoo. For example, our third question mentioned the European Endangered Species Breeding Program, which coordinates species breeding between European zoos. In the post-interview, 53 respondents indicated knowledge about the program compared to 28 in the pre-interview. The increase in correct answers to our two questions about the biggest threat to the habitats of orangutans and the percentage of shared DNA between humans and the great apes was somewhat less, around 50 percent.

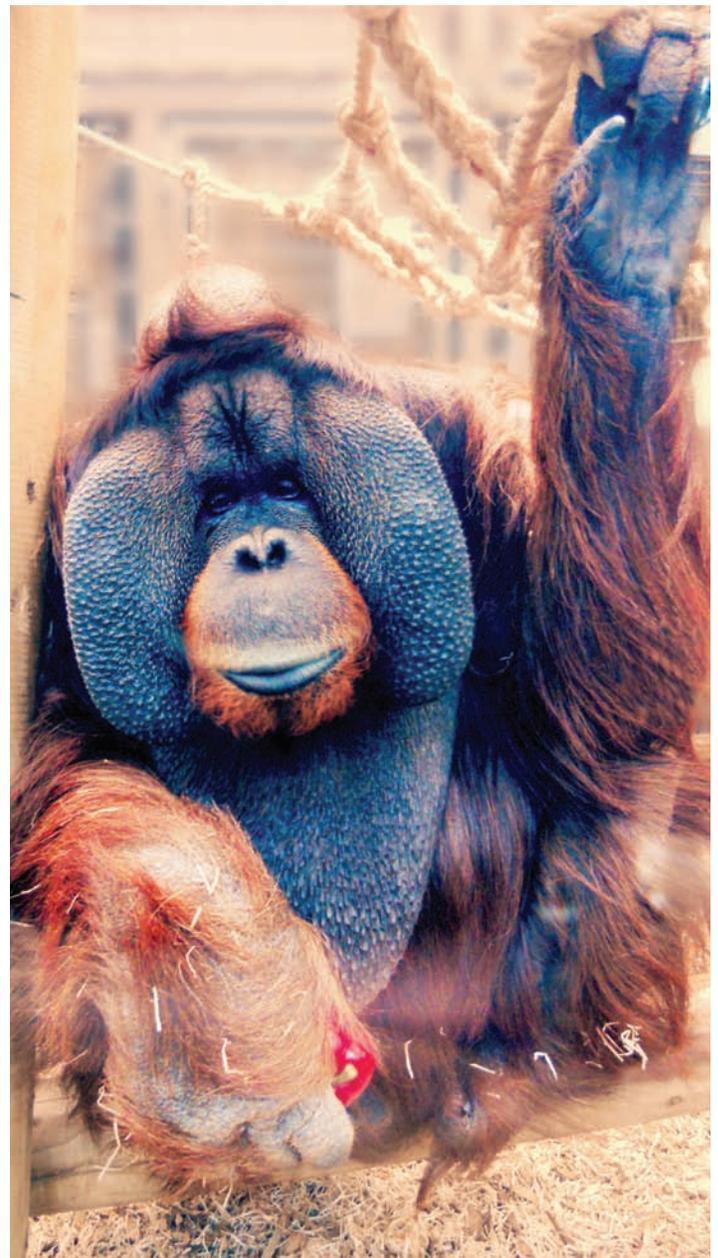


Photo © Julie Louise Hørberg Kristensen/ Colchester Zoo

Rajang, one of Colchester Zoo's male orangutans.

The PMMs indicated that most respondents also learned about great ape conservation issues from their visit. In general, respondents who exhibited learning on the multiple-choice questions did not seem to learn as much from the PMM exercise as other respondents. In other words, the 26 respondents who gave all the correct answers to the multiple-choice questions in the pre-interview were the only ones to exhibit PMM learning.

We tracked visitors throughout the course of their visit to observe what they did, how they interacted with family/group members and educational staff and how much time they spent at the two exhibits. We found that high scores in the multiple-choice questions and the PMM exercise were positively related to the length of visit: the higher the score, the longer time spent viewing the displays and

studying the animals. We also observed that adults visited most displays (although the displays on conservation were among the least visited), spending a total on average of one and half minute on displays. Most families (about two-thirds) interacted with the educational staff at the exhibits.

To learn about the visitors' conversations, we made every effort to get as close as possible without obstructing their free-choice visit. In particular, we were interested in finding out if parents discussed displays and exhibits with their children, and in what ways. The pre-interviews showed us that most agree with the statement that they, as parent or accompanying adult, have an impact on their children's learning about great ape conservation.



Colchester Zoo's new orangutan exhibit.



Photo © Julie Louise Hørberg Kristensen/ Colchester Zoo

We observed that parents mostly used exhibits to encourage children to think about the great apes' daily life. For example, we heard parents saying: "Look, the orangutans have carrots and broccoli for dinner, just like you."

Children, for their part, noticed the concrete behavior of the great apes: "they're eating," "they're playing" or "they're sleeping."

In post-interviews, we noted that all families agreed with the statement that interventions by staff encourage conversation and social interactions among family members. Most wanted more staff interaction: educational presentations and question-sessions with the keepers, as well as general guidance and storytelling about the animals in the exhibits.

Discussion

Prior investigations using the CML framework have indicated that factors within the personal, social and physical contexts all influence individual learning outcomes and that no single factor emerges as capable of explaining learning outcomes across all visitors (Falk and Storksdieck, 2005). Our research was based on the idea that the CML is a valuable framework for inquiries into families' learning in a zoological park or aquarium setting.

We particularly stressed the need to add physical and cognitive learning tools to the factors that constitute the three contexts of learning. Vygotskian socio-cultural learning theory, which basically supports the idea that learning is contextually situated, provides theoretical support for the inclusion of tools, such as languages, into the model.

Despite an improved learning outcome on great ape conservation amongst adult respondents, our results suggest that parents did not share the knowledge that they had acquired with their children. Even though most respondents readily

agreed that parent mediation is important to children's learning in a zoo, they failed to live up to their own expectations. Or, rather, that is one explanation. Based on our field observations, we tend to attribute their somewhat counter-intuitive behavior to the fact that most parents find it difficult to conceptualize zoo conservation information to their children.

The park's displays frame the topic of great ape conservation in terms of "habitat destruction", "tree management", "bush-meat", "fair trade organizations" and "endangered species breeding programs." Children, as well as adults talking to children about the great apes, took an immediate interest in the animals, their behavior and lives. Parents appear to be well aware that their children lack the socio-linguistic resources to cope with conservation issues in the way they are presented by Colchester Zoo and its educators.

Conclusion

The concept of scaffolding might be useful to understand the differentiated learning outcomes of families. Usually affiliated with Vygotskian learning theory, scaffolding refers to the way in which the learning process of children gradually proceeds via focused and positive interaction with adults. The scaffold is the physical and cognitive means by which the learner is able to "climb" the ladder of learning.

The children we observed simply had no scaffold for understanding great ape conservation. Their parents were unable to provide it, although they did exhibit learning from the visit. One of the reasons might be that the Zoo's scaffolding assumes a higher level of learning. The latter claim is supported by the fact that the adult respondents who gave the correct answers to the pre-interview multiple-choice questions also exhibited the greatest learning outcome in the PMM exercise. They were the ones to benefit the most from the scaffolding provided by Colchester Zoo.

Our findings suggest that the cognitive level of the Zoo's education effort is best suited for adults already knowledgeable about great ape conservation. In order to provide scaffolding for less informed adults and children, parks such as Colchester Zoo might simply begin altering the wording of its interpretation and displays, or lowering the scaffold so to speak. This could be done by changing the conservation messages to target children in such a way that their parents are able to act as active mediators of learning—something for which they appear to be highly motivated. Another idea is to make use of physical tools of learning. After the completion of this study, Colchester Zoo opened a new orangutan exhibit to its visitors (see photo spread to the right). One attraction proved very appealing to children; the donation machine. The machine allows children and adults to choose between ways in which to donate funds for the conservation of orangutans in Borneo. Using images to convey the dangers of extinction faced by orangutans, the machine not only provides simple messages about conservation but also facilitates social interactions and discussion among children and adults.

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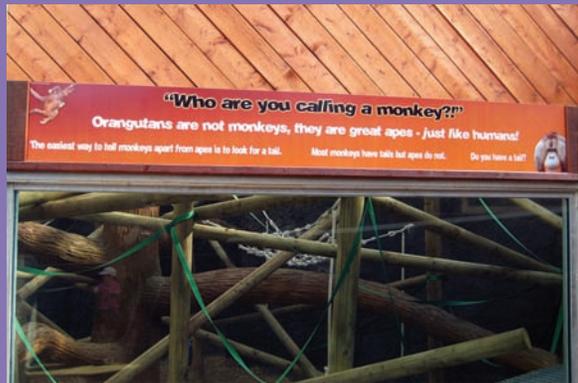
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New conservation display which attempts to be appealing to adults and children.



New conservation display which attempts to be appealing to children.



New conservation display which attempts to encourage interactions between adults and children.



This badge machine gives visitors the opportunity to donate money to help orangutans. All money goes to the Borneo Orangutan Survival Foundation.