

Chapter 11

Receiving the Message – Environmental Education at Dioramas



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11.1 Introduction

Environmental education (EE) is of increasing importance. It encompasses different dimensions of affect, knowledge, skills and behaviour (McBride et al. 2013). The contribution of biology educators is to provide a scientific perspective that goes beyond presenting factual information. It is not to teach the ‘right answers’ but to equip citizens to take part in debates focussing on environmental issues (Slingsby and Barker 2003). To address the values and attitudes in developing an environmentally conscious behaviour, it has been suggested that the key entry point for environmental education is via the affective domain (Iozzi 1989), and Littleddyke (2008) argues that the cognitive and affective domains need to be explicitly integrated in a science education that includes environmental education. Storksdieck (2006, p.16) specifies some basic structural problems that formal environmental education seems to suffer from: (I) EE is marginalized in the school curriculum, (II) discipline-based instruction does not fit the interdisciplinary nature of most environmental problems, (III) schools fail to inspire students (in contrast to mass marketing), (IV) the mass media influence students, leaving them confused, (V) schools lack the media means to connect students emotionally with abstract global issues and (VI) schools rarely provide opportunities to practice pro-environmental behaviour. Storksdieck argues that out-of-school environments can enhance formal environmental education by being both complementary of and supplementary to schools. Many zoological gardens have indeed an emphasis on different aspects of environmental education, especially on conservation of the living world, including endangered species. However, this educational task is often difficult for visitors because they have a limited knowledge of the complex field of conservation biology. Therefore,

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educators need to introduce them step by step to these issues, to overcome their knowledge and understanding deficit and probably also their interest deficit (Tunncliffe and Scheersoi 2009; cf. Fig. 11.1, “conservation pyramid” representing a model for the progression of knowledge and understanding of concepts in biodiversity and conservation biology; as this model was derived from investigating spontaneous conversations it might be as well considered as a hierarchy of the degree of interest as discussed by Dove and Byrne (2014)).

11.2 Hypothesis and Research Question

We suggest that museums which contain natural history dioramas could also contribute to environmental education and might be even superior to other out-of-school learning environments in regard to certain key aspects: Interrelationships between animals, animals’ needs and habitats can only be presented partially with living animals, in zoos or when observed in nature. Natural history dioramas, in contrast, offer a scenario with a complete context in a named environment (ranging from the immediate location to scenes from other parts of world). It is a constructed representation with key concepts illustrated, and represents interactions and relationships between animals and/or plants, illustrates habitat characteristics, as well as adaptations and can even include human traces, such as cultural relics.

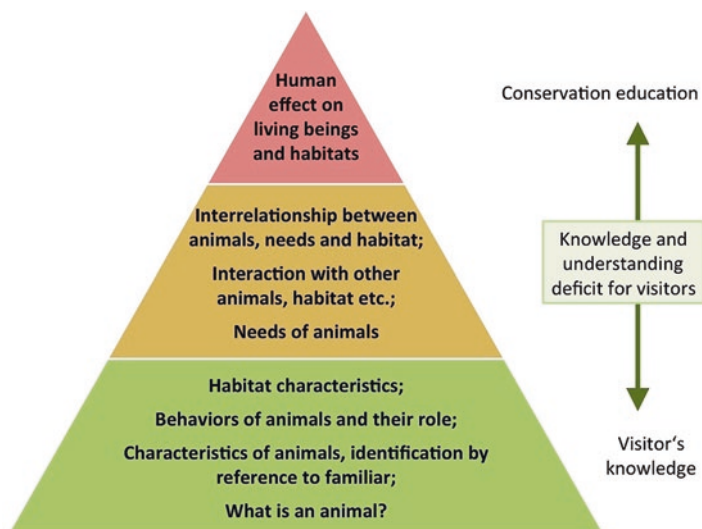


Fig. 11.1 “Conservation pyramid” representing a model for the progression of knowledge and understanding of concepts in biodiversity and conservation biology. (Tunncliffe and Scheersoi 2009)

Our research has shown that dioramas attract a wide range of museum visitors and provide starting points to visitors' engagement through the recognition of familiar objects or by presenting intriguing situations (e.g. Scheersoi 2015; Tunnicliffe 2015). Specific diorama features support further knowledge acquisition, e.g. the dioramas' stillness with the opportunity to "stand and stare" (Tomkins and Tunnicliffe 2001), feelings of immersion (Bitgood 2014) and their narrative approach (Reiss and Tunnicliffe 2011).

Even if the original aim of most diorama designers was not to convey conservation messages, with the passing of time, these historic dioramas can enable visitors to recognize changes that have happened in the environment and stimulate them to reflect on why the changes may have occurred.

In former studies, visitors have been observed talking about conservation issues at dioramas (Scheersoi 2015). Such conversations were induced by different features of these dioramas that offered visitors the possibility to...

- ...see "flagship species" such as beavers or black stork who have almost disappeared in the presented environments,
- ...realize that the presented (mostly local) environments had undergone changes since the time of the diorama's construction (e.g. "The farmland diorama, there are lots of flowers. And when you look today, you do not even see a poppy anymore", cited from Scheersoi 2015),
- ...discover unexpected human traces in the presented environments, such as a beer bottle in an elk diorama at Frankfurt's Senckenberg Museum.

We therefore wanted to find out what kind of ecological information visitors grasp from dioramas and under which conditions they receive conservation messages inherent in natural history dioramas.

11.3 Methods

To answer to our research question, data were collected at a Natural history walk-through diorama at the Koenig Museum (Bonn, Germany) representing the African Savannah (see Fig. 11.2 for a plan).

Sometime before our study, thieves had broken into this diorama and had sawn off and stolen the rhino's horns. However, as the original horns had been taken away before this incident and stored in a museum safe to protect them from theft, the thieves just took away some copies made from plaster without realizing their mistake. The museum staff decided not to replace the horns but to present the rhino deliberately without horns (Fig. 11.3) to create encourage visitors' awareness and to foster their engagement with conservation concepts. A text label was provided to explain the issue.

During our study, two different text versions were tested: while the first text was quite plain and focused on the fact that thieves had been in the museum to steal the horns, the second version was carefully designed respecting the recommended



Fig. 11.2 Floor plan of walk-through diorama representing the African Savannah in the Koenig Museum (Bonn, Germany) ©ZFMK, U. Vaartjes

criteria for museum texts (e.g. Bitgood 2003; Screven 1992). It started with a short question as teaser, included a picture of the rhino with its horns and concentrated more on the demand for rhino horn. QR codes were used in this version to offer additional information about how to support conservation activities. The two texts were exchanged halfway through the study.

For our study, small groups of leisure visitors ($n > 130$) were observed (unobtrusive visitor tracking; the visitors were not aware they were being observed) and their spontaneous dialogues were captured by taking notes on a prepared observation sheet. The transcripts were analysed by establishing categories in relation to the progression levels in ecological concepts, as reflected in the conservation pyramid model by Tunnicliffe and Scheersoi (2009).

To find about the visitors' ideas and environmental knowledge, additional post-visit interviews were conducted (and audiotaped) with a smaller number of visitors ($N = 27$, in 11 groups).

Fig. 11.3 Rhino without its horns in the African Savannah diorama. (Photo: L. Weiser)



11.4 Results and Discussion

The results show that the diorama attracts visitors and provides emotional access to the themes presented: Many visitors are surprised by the size of certain animals like the kudus, the python or the giraffe. They also express their fear of dangerous animals like the lion or the scorpion or their disgust about the spider or the termites.

e.g.

Woman and child watching a film that is shown inside the termite hill (peephole):

Woman: “These are termites.”

Child: “Do they live inside (the hill)? Yuck, disgusting!” (#79; Reference number for transcript)

Surprising details in the diorama (like butterflies sitting on elephant dung) or animals that are presented doing “interesting things”, like some grooming apes or an impala that scratches its head with its hind leg, evoke positive emotional reactions like laughing.

e.g.

Child: “Wow, look at the zebra! Water is dribbling out of its mouth!” (...)

Man: “A drooler!” [the whole group laughs] (#75)

This is also in accordance with our interview data, showing that visitors are fascinated by the type of representation (diorama) and perceive the Savannah as ecosystem with its different components.

e.g.

Young woman: “Well, I realized that you see these different animals here that all belong to the Savannah. The natural world here just looks as if it was real, just as if it was here inside (the museum). The trees look so real, like in the desert, so dry. That’s what I found really interesting.” (Interview #3)

In relation to their knowledge in biology/ecology, the majority of visitors can identify elements within the natural history diorama. They identify certain species, often drawing on their previous knowledge, and comment on environmental elements such as dry grass (conservation pyramid, level 1).

“They look like chicken.” (Guineafowls, #60)

“The stork also lives here in Germany.” (#75)

“Look, we also have magpies in our garden. They steal the eggs from all the other birds.” (Pied crow, #107)

“A deer!” (Antelope, #96)

“You see? There is a deer. (...) and a wild boar.” (Greater kudu and warthog, #119)

“A coati, no – an anteater.” [reads text label] “Oops, it’s an aardvark!” [laughs] (#114)

“There is the eagle. On the tree. Maybe a baobab.” (#58)

“It’s dry, it is very hot here.” (#102)

“Look, that’s what a desert or savannah looks like!” (woman – presumably grandmother – to child, #65)

“That’s what it’s like... dry. The black spots – there has been a fire.” (#75)

Due to the type of presentation (e.g. snapshot of animals in action; Fig. 11.4), visitors detect additional information about the animals’ characteristics or behaviour.



Fig. 11.4 Snapshots of animals in action in the African Savannah diorama: Leopard (left) and Cheetah (right) (Photos: A. Scheersoi)

Man: “Yes, you are right, this is a cheetah.”

Child: “Yes, and you can tell that they are really fast.”

Man: “True, because it runs like that, right?” (#125; cheetah is shown running, hunting a warthog)

“Some animals take their prey into a bush, and the leopard eats on the tree.” (#60)

Some visitors spontaneously discuss interactions and relations between animals and elements in the environment. They recognize social relationships (such as mother and offspring) or predator-prey relationships (conservation pyramid, level 2).

“Oh, they are prey.” (termites, #45)

Child 1: “Grandpa, look, the butterflies – they are sitting on the elephant poop!”

Child 2: “A warthog.” [points at it],

Grandfather: “Yes, the one running away from the cheetah is a warthog. And on the rhino’s head, that’s a bird.” (#56)

Child “There is a small and a big giraffe.”

Woman (presumably grandmother): “Who is the big one?”

Child: “The father!”

Woman: “Yes, right.” (#57)

Child: “This burrow is too small for warthogs.”

Woman: “Yes, but the cheetah cannot get inside. That would be good then.”

Child: “Why?”

Woman: “Because the cheetah cannot eat it.”

Child: “Because it does not fit in there? But it is faster!” (#58)

“This is an anteater, and it makes holes in their house.” [points at the termite hill] (#116)

“They delouse each other. Because of the lice. They take them out of their fur.” (#126)

Man explains to child: “Look at the site of it (termite queen)! The whole day it doesn’t do anything else but to eat and lay eggs. They live in the desert, it’s so hot there that they build underground corridors, and these are ventilated by fresh air to cool it.” (#97)

In spite of the cue provided by the museum (= rhino without horns), only few visitors spontaneously comment on conservation biology issues, such as changing environments due to human influence, e.g. extinction of species (conservation pyramid, level 3).

Woman: “Look, not even this rhino has got horns anymore. It’s because animal welfare activists took many horns off to prevent rhino poaching.” (#82)

The interview data reveal that many visitors seem not to notice the rhino, maybe because they do not expect such incidents:

I: “Did you reflect on themes such as human influence on nature or wildlife conservation when you were visiting this diorama?”

V1: “That does not really come up here, because all kind of species are present and human beings cannot be noticed, everything looks really idyllic. If there had been a street or a hut or something man-made, but everything is just like you would imagine it to be.”

V2: "If they had thrown some Coke cans in here the theme would have been more present. Or birds exposed to oil or something like that. But everything here is very untouched, natural."

V1: "That's what one wants to see I guess."

V2: "Yes, such an idyll, maybe even cliché."

V1: "Indeed, pristine, in a natural state as it should be." (Interview #8)

Other visitors were observed to notice the rhino but they did not try to find an explanation or at least did not talk about it:

Child to woman (presumably grandmother): "Look at the rhino. Did they break it or what?"

Woman: "No idea." (no further response or action; #128)

Child: "Why are they missing, the rhino's horns?"

Woman: "I don't know." (no further response or action, #113)

One reason might be the fact that many leisure visitors come to the museum to have a pleasant (family) event and do not want to think or talk about serious issues such as animal poaching, especially if they are with children.

I: "Did you see that the rhino's horns are missing?"

V: "Yes [laughs], I saw that ... But he [points at small boy] is still too young. I would talk about it with elder children." (Interview #1)

V: "I am here with my little son. I was thinking about how to explain all this to him. Then I just pointed at certain animals. The snake, and so on. (...) This is all very interesting, but he (son) is still too young." (Interview #5)

The following interview excerpts show that other visitors use their everyday knowledge to explain the missing horns and that their knowledge about conservation issues is often limited:

I: "Did you see that the rhino's horns are missing?"

V: "Yes. I thought what is that? Maybe repair work or construction works. Yes, that was... But what is it actually?" (Interview #5)

I: "Did you see that the rhino's horns are missing?"

V: "Yes, I saw it last time already. To be honest, I thought it was just broken. But of course, if I think about it now species conservation crosses my mind." (Interview #6)

I: "Did you reflect on themes such as human influence on nature or wildlife conservation when you were visiting this diorama?"

V: "Yes, even... I mean that rhino up here. It's like...I don't know if he was in an accident or something like this or something else that caused him to not have the horns. (...)

So yes, I was totally thinking about that. Maybe that someone broke it. Or was it meant to be that way?" (Interview #7)

I: "Why did you think that it was just broken?"

V: "In other cases it looks like a wound. If you... Well, I've seen it – when they want to hint at ivory poaching... it always looks really martial... That's why I thought that this here is maybe just repair work." [he laughs] (Interview #8)

In contrast to the above mentioned unambiguous diorama features in other museums that clearly hint at environmental issues and human influence on nature (e.g. beer bottle in the elk diorama), the missing horns in this study give room to different kinds of interpretation. They can be explained with repair or restoration work and do not automatically provoke thoughts about conservation issues. It became obvious that additional information is necessary in this case to prevent misinterpretations.

However, the given text explanation does not seem to provide a satisfying solution: The largest part of the visitors observed in our study, did not read the explaining text information. Even if visitors read the text, with the first text version, in conversations, they focused more on the fact that thieves had been in the museum and done useless illegal things rather than on the issue of rhino poaching.

After having read the text label (version 1), a man explains to a child what has happened.

Child: “But you are not allowed to step in here.” [in the diorama]

Man: “Yes, but thieves don’t care.” (#38)

Child: “Why are the tusks missing?” [she points at the rhino, obviously meaning horns not tusks]

Man: “They have been sawn off. Some idiots have been in here and took them off without realizing that they were fake”.

Child: “Did they sell them?”

Man: “Yes, they wanted to sell them but who buys plaster? You can get plaster for some cents at the building centre!”

Child: “You mustn’t go in there.” [she points at diorama]

Man: “No.” (#97)

The second version of the text label that focuses more on the issue of poaching than on the theft in the museum, seems to trigger more thoughts and discussion about conservation issues, as some visitors stay for some time in front of the label and talk about the text’s content (e.g. the use of rhino horn in the traditional medicine or the small remaining number of Javan rhinos).

e.g.:

Woman reads text label to a child: “Every 20 hours, a rhino is killed just for its horns because the price on the black market can be twice as much as GOLD [she repeats the sentence, again emphasizing the word “gold”, then continues reading rest of the text and talks with disgust about the theft]. (#122)

However, the second version of the text is also only read seldom, and the QR codes (further information about rhino protection) were not used by any of the observed visitors.

Our data show that dioramas are attractive to museum visitors, and offer opportunities to grasp ecological information such as different types of biocoenosis or relationships between animal and plant species and their habitats. However, complex biological concepts are difficult to transmit. To stimulate visitors to reflect on conservation issues, such as human influences on nature and the extinction of certain species, specific and unambiguous cues are needed. The rhino without its horns

in our study, left room for alternative explanations (e.g. missing horns due to reparation works) and therefore led to misunderstandings instead of hinting clearly at the problem of rhino poaching. Additional text information did not solve this issue as most visitors did not read the text at all. This was also true for the second version of the text label that had been written and designed in accordance with recommended criteria (see above).

Experiences from other museums hint at successful alternatives: The cues provided in the diorama have to be either plain and easy to understand without any further explanation (such as the previously mentioned beer bottle in an elk diorama as a clear sign for human influences and environmental pollution) or surprising and perplexing in a way that the puzzled visitor will search for an explanation – and therefore also read texts. An example could be the intervention taken by the Powell-Cotton Museum (Quex) in their exhibition “Your last chance to see?” (see Chap. 12 in this book): the plight of endangered species has been highlighted through the use of coloured ribbons that were tied around the animals’ necks in several dioramas. This action proved both popular and thought provoking amongst visitors.

Instead of text labels, new media might be a solution to offer additional information in an attractive way and thereby enhance biology learning at dioramas. Several museums are currently trying to integrate interactive devices into their diorama exhibits. In the Koenig Museum’s new Rain forest diorama for example, film presentations, audio information as well as touch screens are incorporated to enhance environmental education and to inform visitors about complex themes such as pollination biology, parasitism, or species conservation. In Darmstadt (Hessisches Landesmuseum), tablets devices can be borrowed and used during the museum visit to receive additional information about the different exhibits, including the traditional natural history dioramas from the beginning of the twentieth century.

11.5 Conclusion

We conclude that visits to museums with specific habitat dioramas can increase visitors’ ecological knowledge and awareness. In addition to explaining scientific facts and environmental problems, dioramas have the potential to connect learners to the natural environment and to evoke emotional reactions. Research found that such a kind of affective connection is a significant independent predictor of intentions to engage with the natural environment (e.g. Hinds and Sparks 2008). Museums, just like other informal education institutions, should emphasize conservation actions in their exhibitions and programs. They can offer “nature experiences” and help people to develop an environmental ethic by making the visit feel like an exploration into nature and create a sense of wonder about nature (Falk 2014). However, it has been shown that specific cues need to be provided in the diorama if visitors are to engage with conservation concepts. It also became clear that it is necessary to

carefully plan these kinds of interventions. Such cues have to be obvious, clear and easy to understand to avoid any misinterpretations. To be able to go deeper into a complex scientific topic, like conservation or environment protection, additional information is needed for the majority of visitors. Texts (and QR codes) are only read by a small number of visitors and therefore do not have the desired effect to inform visitors appropriately. Therefore, there is a need to explore in further studies which kind of media can be used to help visitors to comprehend the correct information and concepts.

References

- Bitgood, S. (2003). The role of attention in designing effective interpretive labels. *Journal of Interpretation Research*, 5(2), 31–45.
- Bitgood, S. (2014). *Engaging the visitor: Designing exhibits that work*. Boston: MuseumsEtc.
- Dove, T., & Byrne, J. (2014). Do zoo visitors need zoology knowledge to understand conservation messages? An exploration of the public understanding of animal biology and of the conservation of biodiversity in a zoo setting. *International Journal of Science Education, Part B*, 4(4), 323–342.
- Falk, J. H. (2014). Evidence for educational value of zoos and aquariums. *WAZA magazine* (15), *Towards an effective environmental education* (pp. 10–13).
- Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology*, 28, 109–120.
- Iozzi, L. A. (1989). What research says to the educator. Environmental education and the affective domain. *Journal of Environmental Education*, 20(3), 3–13.
- Littledyke, M. (2008). Science education for environmental awareness: Approaches to integrating cognitive and affective domains. *Environmental Education Research*, 14(1), 1–17.
- McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get there? *Ecosphere*, 4(5), Art. 67.
- Reiss, M. J., & Tunnicliffe, S. D. (2011). Dioramas as depictions of reality and opportunities for learning in biology. *Curator*, 54(4), 447–459.
- Scheersoi, A. (2015). Catching the visitor's interest. In S. D. Tunnicliffe & A. Scheersoi (Eds.), *Natural history dioramas. History, construction and educational role* (pp. 145–160). Dordrecht: Springer.
- Screven, C. G. (1992). Motivating visitors to read labels. *ILVS Review: A Journal of Visitor Behavior*, 2(2), 183–211.
- Slingsby, D., & Barker, S. (2003). Making connections: Biology, environmental education and education for sustainable development. *Journal of Biological Education*, 38(1), 4–6.
- Storksdieck, M. (2006). *Field trips in environmental education*. Berlin: BWV.
- Tomkins, S. P., & Tunnicliffe, S. D. (2001). Looking for ideas: Observation, interpretation and hypothesis-making by 12-year-old pupils undertaking science investigations. *International Journal of Science Education*, 23(8), 791–813.
- Tunnicliffe, S. D. (2015). Naming and narratives at natural history dioramas. In S. D. Tunnicliffe & A. Scheersoi (Eds.), *Natural history dioramas. History, construction and educational role* (pp. 161–186). Dordrecht: Springer.
- Tunnicliffe, S. D., & Scheersoi, A. (2009). Engaging the interest of zoo visitors as a key to biological education. *Journal of the International Zoo Educators Association*, 45, 18–20.

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