LEARNING SCIENCE IN INTERACTION WITH THE EXHIBIT IN A MUSEUM OF NATURAL HISTORY

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Abstract: In this paper we present a study of science learning in a museum of natural history. We videotaped an educational activity where three teacher students study an exhibit with preserved animals, showing an eagle eating the carrion of a roe deer. There were also a pair of crows; one of them staying at a prudent distance from the eagle, whereas the other pinches the eagle’s tail. Through a practical epistemologies analysis, we studied student’s meaning making through the development of their discourse in encounter with the exhibit. The conversation generated by the activity is represented as sequence steps associated to six different themes. The theme concerning the behavior of the crows was one the themes where the students appeared to have gone furthest in the process of meaning making of the exhibit; they were able to provide a plausible explanation of the scene in terms of ecological relationships. In contrast, the theme concerning the carrion appeared to be considerably more difficult to make sense of; the students were able to fill several gaps concerning the identification of the carrion by distinguishing anatomical details; however, they could not fill the gaps concerning the absence of parts of the roe deer. The previous analysis of the conversation represents a description of learning from the point of view of the students; however it was possible to describe which aspects of the exhibit were noticed, what was easy to make meaning of and what remained unexplained.

Keywords: Museum, practical epistemologies, student teachers.

INTRODUCTION

For many years, museums have been known as environments that encourage informal learning experiences of individuals, families, and school children. In the field of museum education studies, an extensive research has been conducted with family visitors using a socio-cultural perspective (Leinhardt, Crowley & Knutson 2002). However sociocultural studies focusing on the relationship between informal learning, communication, and the purposes of the exhibit are unusual (Rennie, 2007). In this paper we present a discursive analysis of students’ learning in encounters with an exhibit at a museum of natural history. The outcome of the analysis is then used to assess the relevance of the learning taking place, compared with the purpose of the exhibit.

Analysis of practical epistemologies

We used in this study an analysis of practical epistemologies. This method, which allows a description of meaning making in socially shared practices, has been used to analyze learning in school practices (Hamza & Wickman, 2008; Jakobson & Wickman, 2007; Lidar, Lundqvist, & Östman, 2006) and informal learning settings (Piqueras, Hamza & Edvall 2008). A practical epistemology analysis is an analysis of the actions taken by the participants of an activity as they engage in coping with what occurs in the situation. To analyze these actions on a discursive level, Wickman and Östman (2002) introduced four concepts: encounter, gap, relation, and stand fast. Encounters occur basically between persons and between persons and artifacts. As an activity proceeds, the participants notice gaps as a result of such encounters with other persons or artifacts. To fill a gap, new relations need to be
established to what *stands fast*. Stand fast is defined as those words and utterances that are used by the interlocutors without questioning.

**METHODS**

The data presented in this study comes from a teaching activity of the educational program at the Museum of Natural History in Stockholm. The activity selected for our study utilizes a variety of exhibits with preserved animals in scenes that reproduce their natural environments. In small groups, and without the help of exhibition texts, the participants study the exhibits and try to make sense of different animals’ behaviour, ecological processes, and biological interactions. The data presented here comes from three teacher students’ encounter with an exhibit showing an eagle eating the carrion of a roe deer in a snowy landscape (Figure 1).

![Figure 1. The exhibit](image)

In the exhibit there are also a pair of crows, one of them staying at a prudent distance from the eagle whereas the other pinches the eagle’s tail-feathers. The main purpose of the exhibit is to show the co-operating behavior of the crows to steal food from the eagle, but also to challenge the imagination of the visitors by placing details and clues in the scene (i.e. the missing head of the roe deer). The students’ conversation was audio and videotaped and transcribed verbatim. The transcription was coded by marking *stand fast, encounters, gaps, and relations* in accordance with the analysis of practical epistemologies. After that, the conversation was divided into a series of steps, where the criteria for segmentation were the themes discussed during the conversation. Hence, a new step was initiated when the students began a new theme or switched from one theme to another.

**RESULTS**

The conversation generated in the encounter with the exhibit is presented here as a sequence of twelve chronological steps associated to six different themes (Figure 2). Here we present the initial part of first step and theme (“The behaviour of the crows”; Figure 2), showing how the practical epistemology analysis has been used throughout the conversation:

T: The crow… that he dares to pinch… at the tail’s feathers.
E: Yes! Exactly!
E: That the crow dares to go so close!
T: Yes.
T: He [crow] is really pinching him [eagle]!
E: That was cocky!
T: Yes, indeed! Furthermore, I thought… It must be so that… They’re carrion eaters!
E: Mm.
T: So they dare because they’re surely starving.
E: Would he eat the crow?
T: I wonder about it ... They don’t.
E: Well ... it’s not generally in the menu, but...
T: Well ... I thought that ... the little I know about vultures ...
E: Yes ...
T: There are no animals that eat vultures ... They’re at the bottom of the food chain, I think so ... I’m not completely sure ... I just believe so.

Figure 2. The path of the conversation represented as a sequence of twelve chronological steps associated to six different themes.

Two gaps were noticed in this theme. The first gap concerned the behavior of the crows and especially how they could be so close to an apparently dangerous, much larger animal. The gap was filled with relations to the crows being carrion eaters and starving. The second gap concerned whether the crows could be a potential prey to the eagle. They filled this gap in a consequent way with the former relation about carrion eaters by establishing a relation to vultures and their foraging behavior. We may also note that several words stand fast to the students, that is, words that they used without questioning. These words, for example crow, vulture, starve, they, are used as starting points for establishing new relations to fill the noticed gaps.
The theme concerning the behavior of the crows (steps 1 and 9) was one the themes where the students appeared to have gone furthest in the process of meaning making of the exhibit; they were able to provide a plausible explanation of the scene in terms of ecological relationships between the birds. In contrast, the theme concerning the carrion appeared to be considerably more difficult to make sense of, that is, gaps lingered in several occasions. In the different steps where they talked about the carrion, the students noticed rather different gaps, focusing on the species (step 5), anatomical details and missing parts of the animal (step 7, 12).

**Step 5:**
T: Look at the animal [pointing out the carrion].
A: Ah...
T: I get curious…what kind of carrion is it?
E: I wonder…is it a lemm.. [lemming]?…what can it be?
T: Yes! I think so, it doesn’t looks like an animal from the archipelago.

**Step 7:**
T: I wonder which part of the animal…if you think…
E: He [the eagle] has eaten the front part [of the carrion].
A: These are rib bones.
E: Mm.
A: There goes the oesophagus.
E: Exactly, some kind of throat.
T: He’s eaten the whole head!

**Step 12:**
A: The question is if he [the eagle] can eat the head by himself.
T: No, that’s right, the head’s gone…and the legs! Where are they? I’m curious about what kind of animal it is.

The students were able to fill several gaps concerning the identification of the carrion by distinguishing anatomical details. However, they could not fill the gaps concerning the absence of the head and legs; these gaps lingered from step 7 and remained unfilled in step 12.

**DISCUSSION**
Analyzing students’ conversation in this way makes it possible to view their learning as a journey, where the different themes represent alternatives path for the direction of the learning process. For this particular group of students, the six different themes represent those particular paths that they happened to explore in the encounter with the exhibit. The previous analysis of the conversation represents a description of learning from the point of view of the students. However it was also possible to describe which aspects of the exhibit were noticed, what was easy to make meaning of and what remained unexplained. We can conclude, that the students succeeded in finding an interpretation of the scene using a set of ecological explanation, but the carrion was a problematical part in the exhibit for the students. Similar analyses of other dioramas and activities can be performed, either by a researcher, a teacher, or a museum educator, for purposes of research, teaching, or, indeed, fine-tuning of museum exhibits.

**REFERENCES**


