

## Program changes

In 2007, the program has been expanded, with Children's Zoo staff accepting one student per week, working entirely in that part of the zoo. This has doubled the number of students able to undertake the program. Applicants were able to give preferences for the type of program worked: across five zoo rounds or all in the Children's Zoo. Already it is evident that students working in the Children's Zoo alone are thoroughly enjoying it. Some advantages of working in this section all week are:

- They work with the same staff and become very familiar with the people, site and routines
- Keepers in the Children's Zoo are very positive about work experience students and value their efforts more than some rounds, especially where the risk of injury to students or stress to animals is higher
- Animals from all major animal groups (mammals, reptiles, birds, fish, amphibians and invertebrates) are managed here
- There is much more animal handling, to condition the animals for human contact, in this section. Most students really enjoy this experience.

## Conclusions

Evaluation is a useful tool for people managing educational programs. This survey provided an interesting insight into the zoo work experience program and its impact on school students. It provided more direction for Zoo Education staff in how to best induct and support students undertaking the program. The keeping staff found the information very relevant and interesting. It also reflected very well on the values and commitment of the young people taking part in this program. ♦

### ACKNOWLEDGEMENTS

The Adelaide Zoo work experience program has evolved over the years and will continue to do so. Having useful information is a way of identifying problems and indicating areas where change is required. When introducing changes which effect other people, like animal management staff in this case, survey information can be valuable in supporting the argument for the change.

The zoo work experience program depends greatly on the professionalism, goodwill and flexibility of the very busy keeping staff, Assistant Curators and Curator. All Education staff members are also involved in organising students on a day to day basis. The support of all these people is greatly appreciated.

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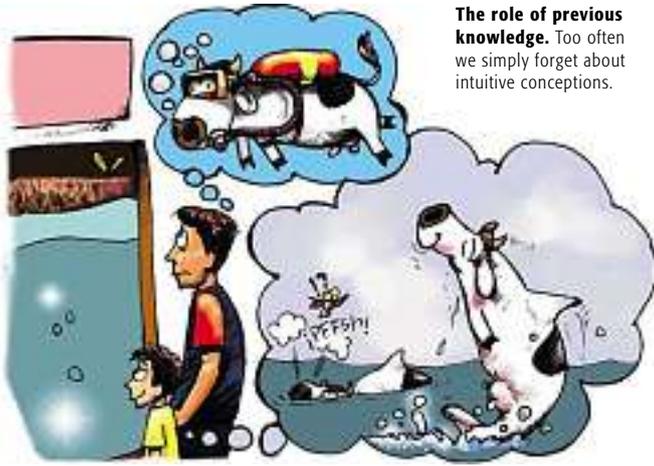
# The Safari of the hidden ideas



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**Many educators probably don't agree with the idea of the *Tabula rasa*. In fact, many people who work as educators in zoos and aquariums know that visitors bring their own mental schedule. They also know that a huge set of intuitive ideas, prior knowledge and implicit theories will be the background with which visitors will interpret the available information on their visit. These facts will also be the background with which they will use educational and interpretive devices.**

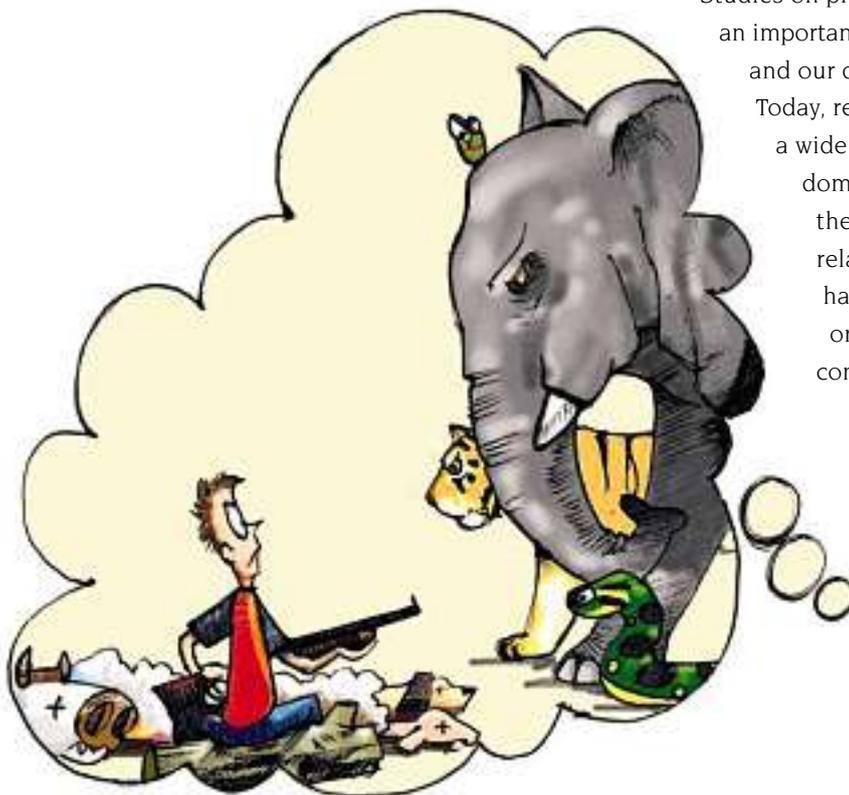
**Tabula rasa** THE DOCTRINE OF *TABULA RASA* SAYS THAT THE MIND DOESN'T HAVE A UNIQUE STRUCTURE AND THAT ITS ORGANIZATION RESULTS FROM THE ENVIRONMENT, THROUGH SOCIALIZATION AND LEARNING. THE CONCEPT OF *TABULA RASA* IS VERY POPULAR AMONG THOSE WHO THINK THAT ANY HUMAN CHARACTERISTIC CAN BE MODIFIED WITH APPROPRIATE CHANGES IN THE SOCIAL INSTITUTIONS OR IN THE PEDAGOGIC RESOURCES. IN THE FIELD OF INFORMAL EDUCATION, TO AGREE WITH *TABULA RASA* SUPPOSES THAT THE USERS OR VISITORS OF MUSEUMS, ZOOS OR AQUARIUMS ARRIVE AT OUR INSTITUTIONS PREPARED TO LEARN OUR CONCEPTS AND MESSAGES WITHOUT CARING ABOUT THEIR PRIOR KNOWLEDGE.



**The role of previous knowledge.** Too often we simply forget about intuitive conceptions.

However, our certainty about intuitive conceptions and the prior knowledge of our visitors and users is not always coherent with the importance that we place on these cognitive elements when we design educational strategies. Quite often we think that the intuitive ideas are not sufficiently important, or that they are easily within our reach. Too many times we simply forget about intuitive ideas. For these reasons, an active and systematic exploration of previous knowledge of the visitors is often excluded from our design or evaluation protocols.

In the last few years, prior knowledge and its relationship to conceptual change has become more important in the panorama of cognitive studies and more specifically their influence within the context of informal



**Domestic versus Wild.** It is surprising that a high percentage of the sample believed that wild animals are less prone to extinction.

**Intuitive conceptions** INTUITIVE CONCEPTIONS HAVE BEEN TRADITIONALLY DEFINED AS IMPLICIT AND SPONTANEOUS PERSONAL CONSTRUCTIONS THAT WE DEVELOP IN THE BUILDING OF OUR MENTAL REPRESENTATIONS OF THE WORLD. THEY ALLOW US TO UNDERSTAND OUR ENVIRONMENT AND TO MAKE DECISIONS IN AN ADAPTIVE WAY. INTUITIVE CONCEPTIONS ARE DEVELOPED FROM AN IMMEDIATE AND DIRECT EXPERIENCE WITH REALITY, AND THEY ARE ACQUIRED FROM PERSONAL AND EPISODIC EXPERIENCES. INTUITIVE CONCEPTIONS HAVE BEEN CONSIDERED AS THE DRIVER OF THE LEARNING PROCESS SINCE THEY ARE THE GROUNDS FOR MENTAL TRANSFORMATIONS AND CONCEPTUAL CHANGE. REGARDLESS OF THEIR INDIVIDUAL CHARACTER IT IS POSSIBLE TO DETERMINE THE CONCEPTIONS OF SPECIFIC GROUPS SINCE REALITIES AND COGNITIVE OPERATIONS OF HUMAN BEINGS ARE GENERALIZABLE.

education. Indeed, what the educators want is to modify the daily and superficial ideas that visitors bring to our institutions and to substitute them with other, complex and scientifically more exact ideas. In order to achieve this objective it is very important to know the nature and the influence of prior knowledge beyond the traditional “misconceptions” that have led us, over a long period of time, to minimize their importance in the learning process.

Studies on prior knowledge and conceptual change are an important challenge for zoo and aquarium educators and our design processes for educational strategies. Today, research on prior knowledge has developed a wide catalog about intuitive ideas in the diverse domains of knowledge. Nevertheless, most of these studies correspond to hard concepts related to physics, chemistry or biology. We have few investigations on social processes or complex ideas such as those related to conservation topics.

**Misconceptions** INTUITIVE CONCEPTIONS COULD REPRESENT IMPORTANT ERRORS WHICH WOULD BLOCK THE LEARNING PROCESS; FOR EXAMPLE A TAXONOMY ERROR: "THE MANATEE IS A FISH"; A PARTONOMY: "THE MANATEE HAS GILLS", OR A MISTAKEN THEORY: "ALL ANIMALS THAT LIVE IN THE WATER NEED GILLS TO BREATHE".

At the Barranquilla Zoo in Colombia, South America, we have begun a process which gives priority to the issue of prior knowledge or alternative conceptions of our visitors. With the support of a team lead by Jose Aparicio, titular Professor of the Psychology Department at the Universidad del Norte, a prominent local university, we have begun the design of a new booklet about biological extinction, and at the same time, we are evaluating the intuitive conceptions of school children who visit the zoo about the concept of biological extinction.

Some of the results show unexpected data about the intuitive ideas of children with regards to biological extinction. For example, almost the entire group of children in the sample (school children between 8 and 12 years of age) could not recognize the difference between the "death" of certain individuals and the extinction of specific taxa. It is also surprising that a high percentage of the sample (78%) thought that any extinction process is reversible. We have also verified some previous findings. For example, children "want" the extinction of certain animals such as snakes and they "don't want" the extinction of big mammals like pandas or whales. Other data are curious and they require more in-depth evaluation. For example 94% of the sample believed that small organisms are more

**Table 1.** Phenomenographic analysis of some dycotomic categories developed from Piagetian interviews in a sample of fifty children about intuitive conceptions of biological extinction.

Dichotomy	Relevant results
Big vs. Small	94% of the sample believed that big organisms are less susceptible to extinction.
Visible vs. Not visible	80% of children believed that hard to see organisms (eg microorganisms) are less susceptible to extinction.
Terrestrial vs. Aquatic	More than half of the sample believed that aquatic animals are less prone to extinction.
Plants vs. Animals	62% of the sample believed that plants are practically not susceptible to extinction.
Domestic vs. Wild	It is surprising that a high percentage of the sample (43%) believed that wild animals are less prone to extinction.



**Intuitive ideas about extinction.** Conceptions that people have about extinction has hardly been researched and in many occasions it is influenced by inadequate conservationist propaganda.

susceptible to extinction. In fact, according to their intuitive conceptions, children think that things that we don't see can't become extinct since they are 'out of human reach'. This category includes sea animals, insects, and animals which live under the earth. Table 1 shows a phenomenographic analysis of some dycotomic categories developed from Piagetian interviews in a sample of fifty children.

Since conservation issues play a critical role in our educational messages, as Purrington (2005) has pointed out in edition number 41 of the IZE Journal, zoos and aquariums refer more and more to the issue of biological extinction in a direct or indirect way. However, very few times, conceptions that people have in this respect have been explored with rigour and on many occasions this is influenced by inadequate conservationist propaganda. Zoo and aquarium educators have the opportunity of capitalizing on the extensive investigation developed on intuitive conceptions to take up the challenge of exploring the issues that interest us. This could significantly influence how we offer resources and educational interpretation to our visitors. Our own exploration of intuitive conceptions about the issue of extinction has opened our eyes to the huge gulf that separates the scientific knowledge that we usually use in our messages from the conceptions used typically by our visitors. Exploring the intuitive conceptions of our visitors is a much more coherent way of being opposed to the doctrine of Tabula Rasa, and a developing experience that in our team we have called: The Safari of the hidden ideas. ♦

## Evaluating intuitive conceptions

RESEARCHERS HAVE DEVELOPED MANY VARIED RESOURCES TO EXPLORE AND EVALUATE INTUITIVE CONCEPTIONS OF PEOPLE. FREQUENTLY THIS EVALUATION SHOULD BE MADE OUTSIDE THE CLASSROOM, SINCE PEOPLE USE MORE THEIR INTUITIVE CONCEPTIONS IN SIMILAR TASKS TO THEIR DAILY PROBLEMS. SOME WAYS TO EXPLORE INTUITIVE CONCEPTIONS ARE:

TO USE QUESTIONNAIRES WITH OPEN QUESTIONS AND SIMPLE STRUCTURE WHICH WILL ALLOW FOR A FREE AND SPONTANEOUS NARRATION, E.G. 'WHAT DO YOU THINK WHEN YOU HEAR PEOPLE TALKING ABOUT THE ENVIRONMENT?'

MANY METHODS USE THE ART OR THE FREE EXPRESSION OF IDEAS THROUGH SPECIAL REPRESENTATIONS AND ANALYZE THE ELEMENTS AND RELATIONS IMPLIED IN THE EVALUATED PROCESS, E.G. 'DRAW THE DESTRUCTION OF THE TROPICAL DRY FOREST'.

IN THE PHENOMENOGRAPHIC METHOD EACH PERSON'S RELATIONSHIP WITH THE EVALUATED CONCEPTS IS ANALYZED, AND THEN THE INDIVIDUAL MEANINGS OF PEOPLE ARE EXPLORED, E.G. 'LET'S SELECT THE THREATENED SPECIES FROM THIS LIST AND LET'S EXPLAIN OUR CHOICE'.

A VERY CURRENT METHOD OF EXPLORATION IS THE CONSTRUCTION AND EVALUATION OF METAPHORS ABOUT THE STUDIED PROCESSES. METAPHORS ALLOW PEOPLE TO USE DIFFERENT INFORMATION AND DIFFERENT CODES TO EXPLAIN A PROCESS OR PHENOMENON. IN FACT, MANY EDUCATORS USE METAPHORS TO EXPLAIN OR TO CLARIFY A COMPLEX CONCEPT.

THE CLINIC INTERVIEW, DEVELOPED BY JEAN PIAGET, IS MAYBE THE MOST WIDELY USED METHOD OF EVALUATION AND EXPLORATION OF INTUITIVE CONCEPTIONS. THIS STRATEGY IMPLIES A DEEP EXPLORATION OF PEOPLE THROUGH AN OPEN AND FLEXIBLE INTERVIEW ORIENTED BY HEURISTIC COURSES OF QUESTIONS.

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### Challenges and perspectives.

Our results have opened our eyes to the huge gap that separates the scientific knowledge that we usually use in our messages, from the conceptions which are typically used by our visitors.

**Conceptual change.** Intuitive conceptions are considered the engine of the learning process as they are the grounds for mental transformations and conceptual change.

