Comprehension

The most complicated process associated with learning is comprehension. How does the visitor make sense of the information from labels? What variables influence how visitors comprehend? Several factors studied in the literature are: naive notions, explaining difficult ideas, learning styles, the constructivist approach, and the Denver Art Museum approach of helping the novice comprehend like an expert.

Naive Notions

Borun, M., & Adams, K. (1991). From hands on to minds on: Labelling interactive exhibits. In *Visitor studies: Theory, research, and practice, vol. 4.* Jacksonville, AL: Center for Social Design. Pp. 115-120.

This study reported on the development of an interactive exhibit that attempted to correct misconceptions about gravity. A label was written to: give operating instructions for the interactive; describe the demonstration (help visitors observe); and teach a concept.

Visitors seemed to have little difficulty with operating instructions. Comprehending the science concept, however, was more difficult. Several versions were tried:

One version of the label stated "Spinning does not create gravity." The word "not" was often missed and the exhibit appeared to increase the misconception rather than eliminate it.

Another version paired conceptual statements with descriptive ones. The label first described what happened on the model earth ("The earth's spinning flings things away.") Then, the label generalized from the concrete observation — "Spinning always flings things out." About 33% of respondents did not seem to understand.

The final version below decreased the misconception about the earth's spinning:

Separate and Unequal Forces.
If the Earth stopped spinning,
Gravity would still hold us down.
Can you prove it?
(Use the on/off switches)

Bitgood, S. (1995). *Freshwater wetlands exhibition at the North Carolina State Museum of Natural Sciences. Final Report.* Jacksonville, AL: Center for Social Design.

Part of this evaluation assessed two interactive exhibits, one that demonstrated how wetlands decrease flooding and the other how wetlands filter water. Both of these devices initially produced misunderstandings. When the key points (i.e., "Wetlands prevent floods" and "Wetlands filter water" were made explicit and placed in a prominant location, these misunderstandings were quickly dispelled. Labels for interactives are often more effective if the main point is simply and explicitly stated and the what-to-do instructions are placed near the controls.

Explaining Difficult Ideas

Rowan, K. (1992). What research says ... #19 — About explaining difficult ideas. *ASTC Newsletter.* Nov/Dec, 7,8,10.

Ideas may be difficult to understand for any of three reasons: (1) the language is not understood; (2) the processes or structures cannot be comprehended; and (3) the concept is not easily believed.

Difficult-to-Understand Language

A concept's critical features must be distinguished from those that are variable. Explanations should focus the learner's attention on this distinction by providing: (a) a typical example of the concept, (b) a definition that includes the critical features of the concept, (c) examples and nonexamples, and (d) exercises that allow the learner to practice making distinctions between examples and nonexamples.

Hard-to-Visualize Concepts

This problem can be overcome with quasi-scientific explanations. To be effective these explanations should contain:

- Highlights of the structure (titles which suggest models, analogies that organize ideas, and topic sentences (e,g, "Radar works like an echo")
- Vivid titles ("Blending in could save your skin" for an exhibit on camouflage)
- Headings
- Transitions and signalling phrases ("The key point is")
- Diagrams

Don't adhere rigidly to readability formulas which may not accurately reflect the audience's ability to understand text.

Hard-to-Believe Ideas

Transformative explanations may help visitors understand counter-intuitive concepts. People have difficulty in understanding why their own naive theories are inadequate. Guidelines for transformative explanations:

- State the "implicit" or "lay" theory
- Acknowledge the plausibility of the naive notion
- State the more accepted explanation and illustrate why it's better