

## Chapter 20

# Development of a Museum Exhibition System Combining Interactional and Transmissional Learning

**Shinichi Hisamatsu**  
*The University of Tokyo, Japan*

### **ABSTRACT**

*“Hands-on” exhibitions, which not only present objects for viewing but also stimulate learning by allowing visitors actually able to touch them, is gaining increasing popularity at museums. By actually handling an exhibited object, the visitor can get a better understanding of the characteristics of the object that cannot be fully grasped by just looking it, such as the object’s underlying structure and hidden aspects, as well as tactile information like the object’s weight, hardness, and so on. The experience also arouses curiosity and interest and becomes a learning opportunity for the viewer. The author has developed an interactive exhibition system for museums, which combines learning based on the interaction with physical objects and knowledge transmission. In this system, the user handles and looks at an actual physical object, which appears just like the original object and talks directly to the user. This “conversation” with the object as the user “grasps” (in both senses) the object deepens the user’s understanding of and interest in the object. This “narrative” feedback to the user is achieved through the active linkage between, in the case presented here, a fossil in real space and three-dimensional computer graphics employing Augmented Reality (AR). The system uses RF-ID technology to determine the level of the user’s “grasping” state and to feed back information to the user. In this chapter, the author presents the actual implementation of this interactive system at a museum and a school. The system was tested with elementary and junior high school students and I present results of the trials that show the convenience of the system and its beneficial effect on learning.*

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## INTRODUCTION

The functions of museums can be broadly divided into the following:

- Introducing
- Exhibiting
- Disseminating knowledge
- Researching
- Storing
- Managing

For some time, museums have been experimenting with a diverse range of exhibiting modes, for example in contrast with the conventional exhibition format.

In contrast with the conventional exhibition format in which exhibited objects cannot be touched, Caulton (1998) presents an interactive exhibition system called “hands on.” Hands on is characterized by the interaction with physical objects, and according to Koran et al. (1986), exhibits with which it is possible to interact attract more visitors and draw their attention longer than exhibits without interaction.

However, through the use of the sole interaction, for many exhibits some parts might remain impossible to be seen, and the information might be difficult to read. To solve this problem, one can suggest the effectiveness of knowledge-transmission content, but this type of content has a tendency to present information one-sidedly and might face difficulties attracting visitor attention due to a lack of interaction. Exhibitions are also organized with hands on parts and knowledge-transmission parts in parallel, but physical objects and content are then separated, which might result in a decoupling of the knowledge architecture.

Koshinishi (1996) said that exhibitions in museums should not rely on single senses such as vision or audition to appeal to visitors, but should also assist their intuitive understanding by appealing in a composite way to many sensations.

For that purpose, Miles (1986) delineates several necessary roles for an exhibition medium:

1. Attract the visitor
2. Maintain the visitor’s attention
3. Revive the visitor’s knowledge
4. Provide information to the visitor
5. Stimulate the visitor’s reaction
6. Give feedback to the visitor

“Participatory devices” have been introduced as media achieving such requirements. A “participatory device” plays speech or video content when an action is performed by the visitor, such holding a button down or manipulating a pointing device.

For exhibits to which the visitor is attracted, this kind of system indeed appeals to his/her senses as it combines with the exhibited item at this particular place and time to provide additional information. However, exhibited items are usually set in glass cases, making it impossible for the visitor to touch them. Interaction between the visitor and the exhibited item thus becomes limited, and the acquisition of knowledge from the exhibit is inhibited.

Taking such problems into account, hands on exhibitions, where visitors can actually take the items in their hands and observe them, are attracting attention. Hands on displays are headed for a learning model where the learner “discovers by himself through trial-and-error“, and follows the constructivist idea which considers the learner as a being reconstructing his/her interpretation of the world and the information he/she holds through interaction with the surrounding world. Through the experience of

1. Touching the item
2. Manipulating
3. Trying one thing or another
4. Sensing something through manipulation
5. Searching until one fully understands what one has sensed

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