A STUDY OF EDUCATIONAL PROCESSES IN MUSEUMS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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* * * * *

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One-of-A-Kind
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1992
To my Mother

Betty Lucille Gallant
ACKNOWLEDGMENTS

I express sincere appreciation to Dr. John Belland for his guidance throughout the process, and his willingness to assume responsibility for a "one-of-a-kind" program. Dr. Belland represents, in my view, the quintessence of those attributes that a college "professor" should strive to possess. I would also like to thank Dr. Clay Lowe for his advice and counsel on both philosophical and political matters. Dr. Lowe's classes are those that students look forward to attending because they transcend time and place. I would also like to express my gratitude to all the other members of my committee: Dr. Charles Harpole, Dr. Alan O'Connor, Dr. Robert Wagner, and Dr. Arthur Ffland. I want to also thank Dean Jean Dickershied for her student centered approach, and her effectiveness in helping me to meet the administrative challenges.
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INTRODUCTION

ART MUSEUM EDUCATION -- "CONFUSED AND DIRECTIONLESS"

The Spring/Summer 1990 edition of the J. Paul Getty Trust "Bulletin" states that a 1984 study commissioned by The Getty Center for Education in the Arts found "the field of art museum education to be confused and directionless," according to researchers E. Eisner and S. Dobbs (p. 2). After interviewing directors and educators in twenty American art museums across the country, the report determined that "there is a lack of consensus among museum professionals regarding the basic aims of museum education."

Eisner and Dobbs concluded that "directors, curators, and educators were often operating on different assumptions about ends and means of education programs within their institutions" (p. 2). These conclusions about the status of museum education were also noted by Eisner in the Fall 1987 edition of The Journal of Museum Education in an article entitled "The Uncertain Profession."

A similar observation was made locally in that same year by the then new director of the Columbus Museum of Art, who had just come from the Metropolitan Museum of Art in New York City. She reported in The Columbus Dispatch newspaper that, "we truly do not know how
people learn in a museum, ...we truly do not know how people learn in our environment" (p. 2D).

Yet we know historically that institutions such as the Library Society of Charles-Towne, for example, were established as educational institutions as early as 1773 in the "Province of South Carolina," according to an article by E. Alexander (1968, pp. 61-80). His report and discovery lists a chronology of similar events from the 18th and 19th Century, and there is thus reasonable precedence for assuming that education has indeed been a primary objective of the Museum since its inception.

Two hundred and eleven years later, however, a 1984 analysis of the profession published by the American Association of Museums, Museums for a New Century, indicates that "Museums have yet to realize their full potential as educational institutions." The AAM goes on to state that "We believe a new approach to learning in museums must be developed, one that does justice to the unique learning environment they provide" (p. 132).

This mandate from the AAM, and the several findings and recommendations to surface from the Eisner and Dobb's reports suggest the relevance of framing a study in the museum education field. Those findings concluded that:

1. Museum education lacks a sufficient intellectual base and theoretical foundation, including that of scholarly models in the universities.

2. Many museum professionals don't know the field of education
and make assumptions about it which are counterproductive to the museum's attainment of its educational objectives.

3. Museum educators have little or no technical training in research or evaluation methods relevant to their professional tasks.

4. [Art] Museum educators regard art history as the intellectual core of their field and have given it the highest priority in their own professional preparation.

5. There is a lack of consensus among museum professionals regarding the basic aims of museum education.

My conclusion is that while the many art museums that were not included in the Eisner and Dobbs survey may certainly employ valid methods and means for the delivery and evaluation of educational programs in their environments, based on the evidence it seems significantly clear that museum professionals (directors, curators and educators) generally, and art museum professionals specifically, have yet to identify a ready and reliable domain model on which to base programming for "learning."
CHAPTER I

MUSEUM EDUCATION vs. THEORIES OF LEARNING

Nature of the Problem

Museums have been self-identified as educational institutions, and have mandated that a new approach to "learning" in their environment be developed. The national museum association (which "accredits" member institutions based on criteria that includes the delivery of educational programming), education analysts, and museum professionals seem to indicate that as a group, however, they [museums] have yet to define a standard of (or parameters for) practice for the delivery of educational programming. They also do not appear to share a common focus on content for art museum education, nor have they adopted a needed collateral policy on education curator preparation.

Problem Statement

It therefore appears to be the case that although museums actively engage in education as a part of their day to day programming, no free-standing museum education discipline has to date been developed by either the museum association, or articulated as a policy by practicing professionals.
This leads to two questions which address the problem:

1. Can it be deduced from a synthesis of the research and professional literature on educational processes and exhibit design in science and art museums that a de facto museum education exists?

2. Can a set of educational principles be extracted from a study and synthesis of the museum education literature, and/or developed that will promote "learning" specific to the art museum environment?

Simply put, what is the current status of museum education, and more specifically art museum education, and how can "learning" be encouraged in these settings.

Methodology

In order to discover what may currently constitute education in the museum setting, the method of inquiry employed will involve the case study approach to descriptive research. According to T. Long (1985, p. 179), the case study is a type of observational research that ordinarily uses "non-participant observation," where the investigator is not directly involved in the situation. The investigator does not "control or manipulate" the variables, but does do the in-depth research necessary to explain behavior and document it.

Author D. Ary et al (1985, p. 322), indicates that case studies are conducted with the primary aim of gaining knowledge in
sufficient depth to provide insight. The investigator in a case study is attempting to "discover all the variables" that are important in the history or development of the subject—in this case museum education. According to Ary (1985, p. 330-331) there are eight steps in the process of descriptive research. They are summarized as:

1. Statement of the Problem.
2. Identification of information needed to solve the problem.
3. Selection or development of instruments for gathering data.
4. Identification of the target population.
5. Design of the procedure for data collection.
6. Collection of the data.
7. Analysis of the data.
8. Preparation of the report.

Following these guidelines, and for the purpose of my study I have determined that:

1. The broad implication of the problem shall be defined as a perceived lack of educational programming for "learning" in the art museum environment (as interpreted from the literature).

2. The information or evidence about the nature of the problem will come directly from the museum literature on educational programming and theory (the population) since museums claim to be educational institutions, claim to offer educational programming, and employ museum educators.
3. The instrument for gathering data will be the case study method of descriptive research. The rationale for the inquiry method chosen was to build an "inductive" scheme, based on actual practice for the content, to see how:
   a. Educational programming is configured in the museum.
   b. To potentially arrive at a functional model based on "real" phenomena.

4. The target population from which the data is to be gathered is the museum educator and/or those who are concerned with the actual practice of a museum education—with the beneficiary of this study being the museum visitor who becomes the potential learner.

5. The "design" of the procedure for data collection has been accomplished over several years of researching museum education practice and theory, from being an active member of the national association of museums (AAM), from serving internships in local museums and with curators in the Central Ohio area, and from being employed as the full time Director of the Ohio Museums Association.

6. The data collection will be based on the information that comes from actual reports on museum education and related literature, focusing on specific written articles that were gleaned from all those potentially available because they:
   a. Ostensibly offered divergent views on the similar topic of education (although many proved to "mesh"
during synthesis).

b. Each seemed to have a specific educational concept in mind.

c. Each in its own way suggested an educational approach. Articles that did not describe applied theory (intuitive or stated), or where the method had not been actually "tested" in the museum or similar setting were selected out.

7. Each case study will be critically analyzed, and then synthesized for a final summary and finding. The result of the synthesis will be interpreted through educational theory, and I have provided the potential user with several definitions of "learning" that are pertinent to the domain. I will also interpret and apply the general principles of instruction using media, and will emphasize a "primary" research perspective or agenda, as my contribution to the museum education field. I've done this for the benefit of people acting in the role of museum educator currently in practice that may not have any formal training in these areas.

8. The final report will be in the form of a dissertation in partial fulfillment of the requirements necessary for a doctor of philosophy degree.
Assumptions about the Art and Science Museum Environments.

My broad working assumptions as I began the study are that:

1. The information available in the art museum is different than that in the science museum (on a continuum of concrete to abstract), and one of the purposes for undertaking a study of this nature will be to determine what those variables may be.

2. Opportunities for "learning" (at some level) have been more fully developed in the science museum environment, though many of these methods might be successfully adapted for use in the art museum.

3. Art museums, tend to work on an assumption that the visitor must already possess relevant information about what they are going to see. Because of this lack of consideration of the prior knowledge in the possession of the learner (such as about an art work's style, period or use of materials) the novice has little access to coded information. This would be similar to beginning a lesson on algebra II when the class has only had general math. Many people are frustrated by their inability to obtain educationally worthy experience in an art museum.

4. Another assumption is that the application of learning theory from the psychology of education field, and the general principles for designing instruction using media can
be utilized in the art museum to provide the kind of education or "learning" model that the profession seeks.

**Museum Education Research Sources**

There are at least two major museum-type publications featuring a variety of topics from a variety of contributors that are "scholarly" in nature and that have a broad, national perspective on the topic of museum studies. One is *Curator*, published quarterly by the American Museum of Natural History, and the other is the *Journal of Museum Education*, published by the "Museum Education Roundtable" in Washington, D.C. Another publication is *The Museum News*, which is the house organ of the American Association of Museums. The AAM is the only comprehensive national professional organization in the museum field concerned with policy development, and will also be considered as primary source material describing education in the museum environment.

**Research Literature on Learning**

How to design and execute programming that leads to "learning" experiences in the art museum is the ultimate focus of this study, and in order to come to some understanding about how this might occur, I want to first provide the reader with some definitions of the processes that describe how people learn. Concerning what is
called "learning theory," H. Ellis in his book on the fundamentals of human learning and cognition (1972, p. 4), says that "learning...is a relatively permanent process that is inferred from performance changes due to practice," which is a subset of experience. N. Cage (1974) indicates that some learning concepts go by the names of contiguity, observation, cognition, and information processing.

S. Bartley, in his introductory text on perception (1980, p. 346), in the chapter entitled "Perceptual Learning and Change," defines "perceptual learning" following E. Gibson as "any relatively permanent and consistent change in the perception of a stimulus array, following practice or experience with this array." Bartley goes on to point out in this definition that he is defining two things; the practice and the relative permanence of the result.

J. Guilford (1979, p. 55) says that "informational psychology comes under the general category of 'cognitive psychology'," and all stimuli or situations as perceived by an individual imply potential action. Guilford says that "Learning is defined as a persisting change in behavior due to behavior" (p. 59). In terms of visual perception (where perception is defined as the mental grasp of objects, qualities, etc. by means of the senses; Webster's New World Dictionary, 1970, p. 1054), the eye functions to gather information from the environment to make sense out of the world using memory, attention, problem solving and concept learning.
Ralph Haber (1969, p. 1) in his book on information processing in visual perception says that "sensation, perception, memory, and thought must be considered on a continuum of cognitive activity."

According to A. Woolfolk (1987):

The cognitive view of learning sees people as active processors of information. They initiate experiences that lead to learning, seek out information to solve problems and reorganize what they already know to achieve new learning. Instead of being passively influenced by environmental events, people actively choose, practice, pay attention, ignore, and make many other responses as they pursue goals (p. 235).

Woolfolk goes on to say that "information is stored as visual images or verbal units, or both" (1987, p. 245) and points out that psychologists who agree with this suggest that information which can be coded both visually and verbally is "easier to remember" (p. 245). This may explain why an idea represented with both words and visually with a figure, as we do in textbooks, is so helpful to students.

And, I believe that this is highly relevant to the art museum environment which tends to be primarily "visual" and not verbal (a relative lack of dependence on written material to "explain" objects shown), and the science museum setting which is visual and verbal--and says something about the amount and kind of information processed (and the subsequent ease of access) in each; as many of the cases reviewed in this study will demonstrate.

Learning focuses on the way people acquire new knowledge and skills and the way in which existing knowledge and skills are modified, according to T. Shuell (1986). Gestalt psychologists in
the 1930s, he says (p. 412) were concerned with interpreting "learning in terms of perceptual principles of organization," and were the forerunners of the cognitive view. Cognitive psychology is concerned with various mental activities such as perception, thinking, knowledge representation and memory, he goes on to say (p. 414), and is related to human information processing and problem solving.

According to Shuell, cognitive psychology has influenced learning theory and research in several ways:

1. The view of learning as an active, constructive process.
2. The presence of higher-level processes in learning.
3. The cumulative nature of learning and the corresponding role played by prior knowledge.
4. Concern for the way knowledge is represented and organized in memory.
5. Concern for analyzing learning tasks and performance in terms of the cognitive processes that are involved.

Learning in the Art Museum.

Since learning is acknowledged to be an active process, the typical art museum environment where the artifact is passively placed on the wall for idle or inactive appreciation would seem to defeat any educational purpose that may be imagined by the curator. For visitors to become "active" learners in this setting, exhibit
designers would clearly benefit from new ways to actively engage the learner in activities that are likely to result in the achievement of desired outcomes, such as Gagne's domains for affective, intellectual, and cognitive learning (1985).

According to Shuell (1986), this task of active engagement involves the appropriate selection of content, and an awareness of the cognitive processes that must be used by the learner in order to learn the content. And, an understanding of how prior knowledge and existing knowledge structures determine what and if the student learns from the material presented (p. 430).

As concerns learning and an awareness of the cognitive processes in what I call the "visual environment" of the museum, Robert Gagne (1985) in his chapter on "Language and Pictures in Media," points out that "objects and pictures are frequently used to perform the function of learning guidance by providing encoding images" (p. 297). One primary reason, he says, for the use of objects in instruction is where they are directly involved in the performance expected as a result of the learning, such as if the expected outcome of instruction is the attainment of the skill for using a microscope.

A second, much broader reason for the use of objects or pictures in instruction is that they are the means by which the "learner can acquire the visual images that are presumed to be a very important type of memory encoding and storage" (p. 297). He goes on to say that this is true "even when the performance expected
as an outcome of learning does not itself require reaction to these objects or pictures." Gagne also indicates that "the range of nonlanguage media for instruction is enormously extended by representations in the form of pictures and diagrams" (p. 293), and it is in these forms, he says, that "concrete objects and events...can be presented to the learner."

If what Gagne asserts about the use of objects and pictures as being useful for memory encoding as a fundamental factor in learning is true, then could we not also consider a situation where the image is the primary source of information? I do not exclude "language" but only emphasize objects and pictures for their representational worth, and in fact many of the case studies I present will reveal the use and importance of verbal or written language. And if this is so, then the study of images, or what I call visual information particularly and/or possibly uniquely as found in the museum, can also elicit or define a learning opportunity. As he goes on to say, "instructional events can be designed without the use of language" and they may be so designed for nonreaders, including young children (p. 292).

Concerning the cognitive domain and the use of images, Gagne (1965, p. 298) says, as an example, to "suppose that a cognitive strategy of problem solving is being learned, such as 'waiting until the evidence is in!'" Various problem solving situations to which this strategy is applicable may be presented in pictorial form—such as in television scenes. "The pictures generate a...variety of
images that when retrieved by the learner," provide cues for the transfer of the strategy to new situations in which it may be employed.

Although a discussion of the role of visual and verbal "cues" and the encoding of information will not be covered here, the notion that information in the form of visual data is a factor in the cognitive process is important. For the museum I believe that it suggests both the utility of making the best use of visual information as a primary source of data in the achievement of an effective educational effort, and reinforces the fact that the "learner" can and does engage in an active process using this form of representation (visual images). I am confident that continued research into visual learning in the museum--and in this study, the art museum--has implications for the structuring of educational programming in an environment where objects and pictures are the primary source of information.

In Chapter II, I will narrow my presentation of factors affecting learning in a visual environment, for reference in evaluating the case studies, and for the purpose of producing a prime educational experience for the art museum.
CHAPTER II

INSTRUCTIONAL DESIGN AND THE USE OF MEDIA: AS A PROCESS FOR LEARNING, AND FOR APPLICATION TO AN ANALYSIS OF THE MUSEUM EDUCATION ENVIRONMENT

According to C. Locatis (1984), in his text on media and technology for education and training, people often learn simply by being told—if they understand the word meanings. Age, verbal ability and familiarity with a subject all affect this understanding (p. 116). He goes on to point out that young people are among those that may have a lack of word meaning or depth in vocabulary, as well as those who are studying a field for the first time. Visuals in the form of actual objects, graphics, and photographs provide concrete meaning to words that are otherwise obscure or abstract.

Graphic and object media add a visual dimension to instruction, says Locatis, and objects have the advantage of being able to be handled and can stimulate senses that graphics and photographs cannot. He suggests that graphic and object media present predominantly visual information, and "objects also can indicate weight, texture, temperature, taste, and smell" (p. 129).

He goes on to say that although graphics and objects are often displayed "simply for passive viewing" [such as a painting on a wall
in a museum], they can be designed and used so that students can respond actively by having teachers and trainers ask questions, or students answer study questions and exercises. When objects are used, students can be encouraged to touch, feel, examine, and generally explore. Graphic media are the subject of teaching when "interpretation of pictures and illustrations and graph or map reading skills are being taught" as noted in Chapter I. While object media are "subjects when actual objects are used to impart knowledge about themselves" (p. 133).

Locatis points out that "design is the process of getting from an existing condition to a preferred one" (p. 207), and involves the identification and use of strategies for implementing desired outcomes. The development and use of media, he goes on to say, should be systematic, involving identification of objectives, definition and selection of alternative teaching methods, tryout, assessment, and revision. Utilizing the principles of instruction to guide the design of instructional strategies is more likely to be initially successful, as opposed to the trial and error method.

In the pursuit of determining an ideal or model learning experience in the art museum I believe that the general principles for designing instruction are applicable (adaptable) to educational programming in this environment. In my view, the only mental step necessary to make the leap from the concept of using media for instruction (as formally described in the education literature) to the consideration of objects in the museum as "media," is the
development or employment of an "instructional design" to make full use of the information museum objects contain, or represent. Dear in mind that images don't speak for themselves and frequently do not contain the information needed for a fuller understanding of that object (Efland, 1992).

Where, in my opinion, the existing educational condition in an art museum is predicated on aesthetic appreciation, the "preferred condition" (Locatis, 1984) might be a cognitive outcome (as we might believe is desirable in a school)—such as being able to understand and apply the information represented in/by a painting, for example, to other cases. In my view this approach is invaluable for such explorations as being able to engage in a critical analysis of a style, gaining insight into a message or meaning constructed by an artist, in an effort to create your own "object," or to reach a deeper appreciation of the artist's vision.

If "object media" are to be considered the subjects imparting knowledge about themselves, then a painting can be an "object" worthy of study, about its own content. In my opinion, instructional design strategies can be employed for the effective design of an exhibit—whether a painting on a wall functions as the whole "exhibit," or if the exhibit constitutes the space of one whole gallery in the museum.

The use of technology (such as computers) has implication for the Art Museum environment because of its ability to enhance individual experiences (i.e. the museum is routinely a place not
typified by classroom/teacher guided study, or the lecture-lab type of instruction), and in my view, is one that has the ability to provide the user with a great depth of material. Innovations such as the computer video-disc, for example, allow the museum visitor to pursue a number of paths in the investigation of a given work of art—such as being able to access information about art history, aesthetics or style.

Another author in the instructional design field writes about an approach to learning that is based on the notion that instruction should begin with a special kind of overview that teaches a few general, simple, fundamental, concrete concepts, and then proceed progressively to more complex, detailed, abstract ideas that "elaborate" on the initial concept (p. 64). A. Johnson (1989, pp. 64-65), says that "elaboration theory" focuses on subject-matter organization issues and on the way in which individuals are most likely to organize that subject matter into their own cognitive structures. I believe that this is what actually happens in an art museum setting when the visitor is confronted with an object because the senses may start to actively process the visual "information" only to be blocked by deficits in previous experience. While lack of prior knowledge is a serious problem another is that the "organization" of the information for access may be missing, and this is particularly critical when the viewer tries to interpret what he sees.
The selection, sequencing, synthesizing and summarizing of the content are the principle decision issues for instructional designers, according to Johnson. He states that there are three learning theories that form the basis of this approach:

1. The concept of prerequisites and learning hierarchies, as developed by Gagne & Briggs, where there is a structural order to any information to be learned that needs to be explicit in the establishment of any learning environment.

2. The second "major antecedent" concept is that of procedural prerequisites, which derive from task analysis, or an understanding of how the knowledge to be gained will be applied in a direct way to some procedure.

3. The concept of "spiral curricula" from Bruner, which leads to ET by suggesting the importance of building connections between each new concept and those that precede it, gradually constructing a "complete treatment" of a given subject area (p. 65).

Johnson lists seven components of ET comprised of these antecedent instructional theories. They are summarized as:

1. An elaborative sequence. A "macro-design" approach, it is a simple to complex sequence that "epitomizes" the major idea of instruction. An elaborative sequence takes a broad, general, concrete concept that represents the major ideas to be presented, and builds on that concept
throughout the instruction, gradually adding detail, counterconcepts, and abstractions.

2. A Learning-Prerequisite sequence, which is created to deal with lesson-level organization. Each principle or concept to be learned has a unique set of defining attributes, or characteristics and it is these critical components of the idea that must be understood before new learning in relation to that idea can take place.

3. A summarizer, that systematically reviews material throughout a lesson, to prevent forgetting. This may take the form of a concise statement "recapitulating" the major concepts or principles. A complex concept may require internal lesson summaries—a simple concept may require a single summarizer at the end of the lesson.

4. A synthesizer that relates the learning of a particular subject to a broader body of related, previously learned concepts or principles, and provides a means for the student to tie new learning to previously learned ideas by identifying the conceptual links.

5. An analogy, as a learning device that help tie new learning "vividly and concretely" to familiar ideas. The learner can bring knowledge from one content area to bear on learning in a new content area, and does so by creating strong images of the new material in the terms of known concepts or experiences.
6. A cognitive strategy activator. According to Johnson (p. 65), cognitive strategies are generic, or basic, learning skills. Cognitive strategy activators are simple devices embedded in the lessons that focus the student on a particular strategy. Visual cues such as diagrams, or models can be used to teach many concepts more clearly than can verbal descriptions. Calling on students to use their "visual cognitive strategies" provides them with alternative means of considering the same phenomena.

7. Learner control, particularly in computer-based instruction where the learner may not have a clear sense of where they are in the material. This control system must include learner control of content, rate of learning, cognitive strategies, and order of learning.

And, in pursuit of the outcome I desire to demonstrate (a proposition to achieve museum learning), I cite what F. Knirk (1986) in his book on instructional technology labels as a taxonomy of educational objectives. These refer to the need to further refine the instructional problem after it has been initially examined by developing a set of objectives (p. 80). The broad objectives are called terminal objectives, with the subordinate elements called enabling objectives, according to Knirk.

After the objectives have been written, Knirk says, it is then possible to logically specify instructional strategies and the media
to be utilized. He goes on to say that a taxonomy listing skill levels from simple to complex can help educators and trainers to determine the appropriate instructional level for students. He says that there are usually three classes of educational objectives:

2. Affective.
3. Psychomotor.

Setting these levels is central to being able to critically analyze how well the instruction works, and how a student's behavior changes.

Knirk goes on to say that the Cognitive domain is concerned with the intellectual responses of the learner, such as performing mathematical solutions, composing an essay, or solving mental problems. The Affective domain concerns the attitudinal, emotional, and valuing responses desired of the student. These are also called interests, attitudes, or appreciations. Positive techniques for teaching affective objectives involve differential reinforcement, modeling behavior, and behavior modification techniques.

The psychomotor domain has to do with muscle development and coordination, according to Knirk (p. 83). This would be pertinent to the museum if one were teaching studio techniques in painting, sculpture, or ceramics.

In counterpoint to what is described as the difference between cognitive and affective pertinent to the field of art, Efland (1992) states that "aesthetic valuing often relies upon the attainment of
relevant dispositions which take the form of ideas, facts, concepts, etc., which enable one to apprehend the world of art and appreciate its significance." A division of domains, he says, into cognitive and affective is arbitrary. Values and feelings can be objects for thought, and hence the affective and cognitive are both cognitive domains.

Knirk goes on to say that Robert Gagne's taxonomy of learning attempts to specify what instructional sequences and strategies are appropriate for different types of objectives. The five major categories of human performance or capabilities of the learner for Gagne are:

1. Intellectual skills.
2. Verbal information.
4. Motor skills.
5. Attitude.

Knirk says that Gagne's list contains the three primary taxonomies, but he stresses the cognitive because three of the five capabilities are in the knowledge domain--intellectual skills, cognitive strategies, and verbal skills. Gagne focuses on "what is learned" (p. 84), according to Knirk, and then on the conditions appropriate to each of these varieties of learning.

Lastly, I believe that it is important to take into consideration the status of the learner in the museum, just as it is in the classroom, to be able to effectively design an instructional
opportunity that has the potential to lead to "learning." One of the museum visitor's predominating characteristics would be that he is a "voluntary" learner. That is to say that the museum is not a typical learning and teaching environment, where there is a lecture and a lab session, or in fact where there is a classroom with a teacher to gain the attention of the student, and guide him or her into a process for acquiring and retaining information.

Criteria for Analyzing Museum Education Programming

Having reviewed a broad scope of learning theory, and the principles of instructional design, I have outlined some specific criteria that can be employed for an analysis of the case studies I present from the museum education field. I encourage the reader to participate in this exercise, as well. After a considerable amount of synthesis and research on my part, I believe that these approaches make a great deal of sense for the environment, both in coming to some understanding of the "information" data contained in art objects, and for ultimately being able to structure a learning experience for themselves and others.

I would first point out that design, as a key component of the instructional development process, has three characteristics (Lociatis 1984, p. 288):

1. The presence of a goal (the teacher wants students to learn).
2. Problems must be solved for goal attainment (the teacher has to determine experience that build upon what students already know).

3. Knowledge about the problem situation and knowledge of relevant theory and problem-solving approaches must be used to solve the problems (the instructor must use knowledge about the students, the psychology of learning, and teaching methods).

The following steps A-F will be used as a guideline for my critical analysis of the case study reports, for the purpose of evaluating existing museum education programming for "learning." How do current museum education programs fit into the checklist?

I will then synthesize each case, adding comments which I believe may be illustrative of an educational concept, and in a final analysis will "total" the findings. These will then be weighed against the criteria that I have identified as being significant factors affecting learning in a visual environment, and I will offer my conclusion.

I believe that these steps, which have been culled from the "learning" literature, provide optimum opportunities for the design of educational programs in the visual environment of the museum.

A. Locatis (1984, p. 292) lists some general principles for designing instruction. They are:

1. Introduce novel or unexpected events at the start of instruction.
2. Inform learners of expected outcomes.
3. Recall relevant prerequisite information.
4. Present only relevant information.
5. Organize content and present "organizers."
6. Progress from simple to complex.
7. Provide prompts and cues.
8. Vary information presented.
10. Provide appropriate practice.
11. Provide immediate feedback or knowledge of results.
12. Review and repeat.

In addition to general instructional strategies there are methods for motivating students to learn, and for developing positive attitudes about a subject (Locatis, 1984, p. 298). The aim is to increase the probability that students will study the subject, or engage in related activities.

B. There are seven principles for motivating and developing attitudes:

1. Tell learners that the subject of instruction is important.
2. Present reasons why the subject is important.
3. Arrange external rewards.
4. Ensure that learners experience success and accomplishment.
5. Pair subject matter with things that are attractive to learners.

6. Introduce a discrepant, unexplained, or unfamiliar event.

7. Model interest and positive attitudes toward the subject.

C. According to Locatis (1984, p. 300) there are also methods for teaching specific cognitive skills. Cognitive skills (as noted earlier in this paper) emphasize thinking, thought processes, and intellectual abilities in three areas: concept learning, principle learning, and problem solving. These are:

**Concept Learning.**

1. Determine whether to present a definition.

2. Present very clear, unambiguous examples of objects belonging to the concept class, and indicate the class name.

3. Present examples that clearly are not of the concept class but potentially may be confused as class members.

4. Provide practice/feedback in discriminating between positive and negative examples.

5. Provide practice/feedback in distinguishing between more ambiguous positive and negative examples, depending upon the degree of discrimination required.

**Principle Learning.**

1. Ensure that students have learned prerequisite concepts.

2. Indicate the relationships among concepts.

3. Demonstrate, or have students demonstrate, the principle.
4. Provide practice and feedback in demonstrating the principle.

**Problem Solving.**

1. Ensure that students have learned prerequisite concepts and principles.
2. Present the problem.
3. Provide direction and guidance.

D. Knirk (1986, p. 107) in his text on instructional technology offers some typological information that the designer should keep in mind about the learner. I have chosen those that I believe are pertinent to the art museum setting:

1. Information Processing Style.
   a. Learns best from inductive presentations.
   b. Prefers a high degree of redundancy.
   c. Prefers to learn from tactile and hands-on activities.
   d. Prefers to pace own learning progress.

2. Use of Senses for Perception or Reception of Stimuli.
   a. Learns best from motion visual stimuli (TV, films).
   b. Prefers to learn from auditory stimuli.
   c. Prefers to learn from printed material.
   d. Prefers to learn from several simultaneous stimuli.

   a. Prefers to learn with peers.
b. Likes to learn from peers.

   a. Prefers quiet.
   b. Likes to be able to move around.
   c. Prefers visual isolation, as in a carrel.
   d. Prefers low light and contrast level.

E. Laura Chapman (1978) in her book on "Approaches to Art in Education," speaks to the issue of critical phases in responding to art. She outlines several factors:

1. Perceiving obvious and subtle qualities.
   a. Discriminating basic properties.
   b. Developing multisensory associations.
   c. Exploring symbolism and connotations.
   d. Becoming aware of contexts.

2. Interpreting perceived qualities as sources of feeling and meaning.
   a. Building a vocabulary to describe perceptions.
   b. Empathizing and maintaining psychic distance.
   c. Speculating.
   d. Synthesizing.

3. Judging the significance of perceptual experience.
   a. Personal preference versus critical judgement.
   b. Concepts and criteria for judging art.
F. She also outlines methods for criticizing art, and indicates that "it is important for children [I can interpret "children" to be persons who are in the concrete to concrete operational stage of development] to understand both the process of arriving at a critical judgment and the role of criteria within the process." When children become aware of the criteria by which art can be judged, they are at the same time, she says, "learning about some of the qualities that many people appreciate in art" (p. 80). She outlines the following:

1. The inductive approach.
   a. Perceive (describe) basic characteristics of the work.
   b. Perceive relationships between parts.
   c. Perceive regional and overall qualities.
   d. Perceive (interpret) aspects as they relate to experience.
   e. Interpret and summarize the recurrent ideas, themes, qualities.
   f. Judge the work by citing criteria and offering evidence to support the judgement.

2. The deductive approach.
   a. Decide on the criteria you will use (the 4 noted).
   b. Examine the work to identify evidence that specific features do or do not meet the criteria.
   c. Decide on the degree to which the criteria have been met.
3. The empathic approach (and involvement).
   a. Don't overlook the obvious.
   b. Do not overlook purely visual qualities.
   c. Use analogies and metaphors to relate what you see to what you feel; project yourself into the work.
   d. Use your own experience and knowledge; compare what you see to feelings you have had.
   e. Be persistent; don't be afraid to dwell on one aspect of a work.
   f. Get physically and imaginatively involved.
   g. Judge the work if you want to.

4. The interactive approach.
   a. Select a moderator and clarify the roles.
   b. Draw as many people as possible into the process of describing the work.
   c. Call for guesses and hypotheses when you run out of descriptions.
   d. Move to group discussion of the hypotheses until one or two seem by group consensus.

Summary

Museums contain information and program educational events but according to sources in and out-side those institutions, have yet to meet their potential to educate. This perceived lack of effective
educational programming is analogous to a situation where someone does extensive research for a book but the editors fail to arrange it into chapters, so that it can be easily understood. Museums seem to be failing in their attempts to provide opportunities for people to "learn" from their research—the collection.

In Chapter I, I tried to describe the nature of the problem and point to the direction I wish to take in breaking it down, for the purpose of gaining insight toward possible resolution. In order to determine what museums actually do in their environments about education, I am employing the case study method of descriptive research to review actual museum and related reports.

To provide insight for the reader, I have provided some advanced organizational material, and in Chapter II have suggested that the principles of instructional design using media are applicable to the object oriented, art museum environment.
CHAPTER III

SCIENCE MUSEUM EDUCATION RESEARCH & THEORY

According to R. Harre, in M. Pollock's *Common Denominators in Art and Science* (1981), Johannes Kepler wrote in 1618 that architecture, music, mathematics and astronomy have certain mathematical proportions and harmonies in common, and in such ratios, that a "Neo-platonic God" would have incorporated them into his productions. Taking this view, he asserts that certain commonalties of form can be exemplified in practically anything that has structure.

Harre goes on to outline some possible ways in which "cultural matters [where "culture" includes the sciences] could be correlated," such as where a scientific theory and an art form share a common content. For example, in the early 19th Century, he says, geologists and painters shared a common belief in the flood, known as "diluvialism." Harre says that this kind of "secularization of ancient theological dogmas" is identifiable as a locus for a system of shared beliefs that animated both painters and geologists, and was readily demonstrated in the "painterliness of early geological illustrations."
A second correlation is what he calls the "commonality of style," such as where there is a common historical parallel. He demonstrates this point with the example of the return of physics to "atomism" (via the establishment of the existence of "atoms" by J.J. Thompson--Harre) and the kind of "atomism" of light and color in the Pointillism painting style of Seurat. Harre relates Pointillism to Atomism where "pointillism as a technique is the product of a theory of the nature of color" (p. 258), which is similar to Atomism as a high level theory in physics.

He summarizes the thought by saying that these theories are not theories of art and science, but theories in art and science. By this example Harre correlates a social phenomenon such as Industrialization to be the cause of a cultural phenomenon such as Romanticism. Harre likens this to a general "pool of cultural resources" which affects production, and is thus one possible source of the "common denominator" notion.

Continuing along this theme, Arthur Marwick, in the same compilation text (Pollack, 1981), summarizes what "may constitute common denominators" by saying that the truth about what artists and scientists do is that "scientists are dangerously ignorant about what arts people really do and arts people are dangerously ignorant about the realities of science" (p. 187). The difference, he says, between arts and science subjects is that if science does not work there is a disaster--the bridge falls down--whereas in art, "mistakes" can go on being made and nobody will notice.
Yet, he says that a painting has got to "work" the same way that science has to. For example, if the relationships between Mondrian's blocks of color were ever so slightly different, "then I think that we would not accept Mondrian as an outstanding painter."

I believe that it has been important to begin this chapter with a examination of some of the thinking that occurs on the relationship between the arts and sciences because of the potential context it may offer my study of education in the science and art museum environment. When people begin to discover and understand the many underlying similarities that function in these two settings, they may begin to see that the subject matter is less a restrictive factor than are the "codes" for communication and approaches employed to present the information to the visitor who may become the recipient of information, and thus "learn."

That is to say that, in my opinion, the organizational factor in the Museum is education and may have little to do with the type of museum, and/or its contents. Educational planners have to resolve the issue of a museum education theory--just as public school educators take courses in teaching methods and educational theory, applied then to a specific topic be it math, biology or art. How people learn, and how to present the information is the key component.

Lastly, I prefer to alert the reader to the fact that my method of inquiry generally follows an ontological assumption, which is philosophical in character and implies that there is knowledge
outside of the mind which exits or is independent of its relation to the perceiver (Realism). Werner Heisenberg, in his book, Physics and Philosophy, 1958, pp. 20-21, cites the work of A. Einstein when he said that:

The physical scientist only arrives at his theory by speculative means. The deduction in his method runs not from facts to the assumptions of the theory but from the assumed theory to the facts and the experimental data. Consequently, theories have to be proposed speculatively and pursued deductively with respect to their many consequences so that they can be put to direct experimental tests.

Where the question is raised about what constitutes "knowledge," DeFleur (1989, p. 236) points out that Plato, in his Theory of Forms set forth a sophisticated analysis of "meaning," or what might be thought of as a "theory of concepts." Plato was addressing the most fundamental problem of knowledge—how do we define and understand things that exist outside our subjective experience? DeFleur says that Plato maintained that "human knowledge is developed on the basis of 'universals,' or general ideas about the principal characteristics of each category of things that human beings come to think about (p. 236). Concepts are the "foundations of knowledge and the beginning point for a theory of human communication." According to DeFleur (1989, p. 237), concepts represent "our way of relating ourselves to reality by providing for our internal subjective experiences of things, conditions, and relationships in our physical and social environment."
D. Ary (1985) writes that sources of knowledge may be categorized five ways: (1) experience, (2) authority, (3) deductive reasoning, (4) inductive reasoning, and (5) the scientific approach. Although the other sources are often used, it is scientific knowledge about the educational process that makes the most valuable contribution to decision making in education, according to Ary. In this spirit I assume that learning takes place in the museum environment, and will pursue the discovery of how this may be said to happen in this setting.

If "learning" does take place, then it is possible to plan for and structure the learning experience in a rational way so that repeatable educational outcomes are possible. As I begin to review and analyze the nine cases from the science museum environment, and then the nine from the art museum setting, I call the reader's attention to a consideration of the criteria that I introduced in Chapter II for an analysis of design for "learning."

The Science Museum

Science museums are those that we typically think of as being information-driven, where demonstrations of science phenomena take place, and where we expect to find people manipulating mechanical objects or computers to find out more about what they are going to see in an exhibit. They are usually self-motivating, without the
use of a tour guide, and rely on the exhibit to attract the visitor's attention.

The reports presented in this study range in subject matter from a rain forest to a new children's museum exhibit on sports medicine, and an example of a natural history diorama exhibit has been included with the idea of demonstrating a relationship between art and science. I have applied my evaluation criteria (A-F) to all nine case studies, and each is followed by a critical analysis of what I believe to be their educational focus, and a statement about the educational concepts either stated or suggested in the material.

Case #1


The exhibit opened in 1988 after five years of research, planning, and production, with the mission of communicating "themes of diversity, interrelationships, and commonality among living organisms," according to the authors.

The environment is an American tropical rain forest housed in an 11,000 square foot gallery with 70 cases featuring tropical specimens and education information. Thirty-two sound effects speakers were used featuring the sounds of howler monkeys, birds, cicadas, and a tropical thunderstorm. The exhibit environment also utilized 5 video theaters, an elevated walkway through a simulated forest canopy, informational exhibit text or display backgrounds
with push-button "answer" panels, flip panels, and "look-into"
microscope eye pieces. Sound was "occasionally activated" by motion
detectors, while others were push-button activated. There were 10
video monitors featuring passive and interactive touch-screen
programs.

Prototypes of 14 major exhibits were evaluated during the year
preceding the opening to determine if their topics were
understandable and "whether interactive elements were effective."
According to Korenic and Young, 150 randomly selected visitors were
interviewed, and their responses to a set of questions were
evaluated by a team including curators, an educator, the script
writer, and exhibit designers.

Where this "formative" evaluation "revealed that visitors
were not getting the message," changes in label text and/or design
and other more substantial changes were made. The exhibits were
then re-tested.

Over 60,000 persons visited the exhibit in the first six weeks
and 13,552 visitors were observed, ranging in age from under nine
years to over 70. Groups ranged in size from two to eight.

The goals were to evaluate the exhibit's effectiveness in
getting its messages across, to provide information that could be
used to alter and modify exhibits, and to provide a guide for future
exhibit planning. Two studies were made with one on visitor
behavior and the other on visitor responses to questions.
Some of the findings from the data collected were as follows:
- Visitors used the exhibit well, and no single unit was completely ignored although few people covered the whole exhibit.
- The "deforestation" exhibit had the lowest attraction, while the Biological diversity (hundreds of objects) had the greatest.
- Children aged nine and under were less likely to stop and examine an exhibit than other age groups, with 90% stopping at only 52% of the exhibits, ignoring 14%. 90% of visitors aged 20 years and older stopped at 85% of the exhibits and completely ignored none.
- Type and location of an exhibit affected "attracting power," with the most attractive in direct sight lines, utilizing diorama techniques including "flips" or "oculars" or objects unusual in size, color and variety. The least attractive were those opposite a highly attractive unit, in an area where the path divides, and those having a great deal of text in relation to objects.
- Visitors spent an average of 22 minutes in the hall, and the meantime at specific exhibits ranged from 4.1 seconds to 5 minutes, 34 seconds.
- Manipulative exhibits (push-buttons and flips) had high attractive power for all age groups.
- The diorama-type exhibits of professional activities
(scientists working) appealed to all groups, and the age group 60 and older were most attracted to walkway units containing objects and labels.

The areas containing the five video theaters were most appealing to young children and teenagers. All were used by over 50% of all visitors, and they were always heavily occupied. The Rain Forest Theater (with all the sights and sounds) held visitors for the longest period of time, but the behavior study showed that visitors used the theaters for activities not related to the exhibition—resting, talking, etc.

All visitors exhibited "visual behavior." Otherwise, behaviors of visitors under 20 differed from those over 20 years of age. The younger group engaged in more non-exhibit-related behavior than older visitors, and tended to "use manipulative exhibits to discover how flips worked and what buttons did rather than as learning resources." If results were pleasing, the action was repeated. Older visitors were more likely to use manipulative devices meaningfully with "intent to feel, see, or read."

Visitors read labels most often at manipulative exhibits in order to learn what they needed to do. Exhibits featuring objects and explanatory labels showed a high incidence of reading behavior, but visitors when asked could not remember the written message about the exhibit.
Verbal interaction among group members was most frequently elicited by the diorama-type exhibits, with the video and manipulative exhibits also encouraging this behavior.

Fatigue behaviors were most frequent at video theaters (places with seating and rest areas) although 20% reported that they looked at the video presentations.

The questionnaire method of survey research was used by the team along with interviews. One thousand questionnaires suggested that the exhibit accomplished the basic mission, with the other two [biodiversity and interrelationships] less well understood. The researchers found that many visitors reported leaving the exhibit with new information about rain forests, and the effect of the forests being "dangerously destroyed."

Ninety-six percent expressed a desire to return because they thought the exhibit was interesting and enjoyable. They said they like the design and the feeling of being in a rain forest environment. Many reported finding the amount of detail to be stimulating which also encouraged their desire to return. Others said that they "planned to report to family, friends, or school group and to return with them."

Least liked features were the amount of walking needed, the repetitiveness of the exhibits, the feeling of being visually overwhelmed, and lack of handicap access.

Based on the data received, the team was able to make the following improvements:
Too few visitors stopped at 7 exhibits, but those who did spent a great deal of time. In order to attract more visitors the team opted to move a label or "flip," and to change a label or label headline. They also adjusted lights to increase attracting power.

To increase holding power at 4 exhibits, instructions and identifications of objects were added to labels. Content on these was in response to overheard visitor questions. New signage was placed next to objects so that the visitor, for example, became aware that there was more to see than just a tree.

Researchers reporting on the use of summative evaluation techniques indicate that it "strengthened the team effort," and although it "identifies an exhibit's high and low attractive and holding power, it does not explain why." It provides information but the staff must interpret it and guess what change or improvement will aide visitor reaction. Staff in all cases decided to make the least expensive changes.

Concerning formative evaluation, they concluded that it should be the standard procedure for the development of all major exhibits. According to Korenic, the study showed that the formative evaluation method should have been used for more than just the 14 prototypes of major exhibits the museum produced. She stated that limits of formative evaluation were that their mock-ups were shown out of context, and this led to an inability of the respondents to grasp
sequences easily—negating this cost-effective approach. It did appear to measure how well an exhibit message is grasped, according to author Korenic.

The team indicated some special areas for consideration, and which I believe can be generalized to other settings. They are:

- Visitors spend up to 22 minutes out of an average 2 hour tour in a video presentation. Formative evaluation should include "focus visitor groups" to evaluate video content.
- Video theater placement is "ideal" for providing "advance organizers."
- "Cell" theaters that have a darkened room, with a dark screen are used less than theaters that are large, well lighted, full of plants, animals, pleasant sounds and other people.
- Rest areas that are visually and physically restful are important and should be less visually stimulating.
- Design should provide for the assembly of groups in large enough rooms to accommodate, but allowing for docent or leader voices to be heard, and for seeing the exhibit and for interaction.
- The "you are there" approach, or placing the visitor in an environment with an "atmosphere" is most effective.
- The "explore at will" design versus the single pathway method contributes to a desire to return.
Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Gets Attention/Novel events. The exhibit uses sound activated by motion detectors, sound effects from the environment, and advanced organizers.

B. Motivation. Evidence of signs telling why the rain forest in this example is unique and in danger.

C. The researchers and exhibit designers used cognitive strategies to solve their problems but I did not read any information about visitor's being asked to do so.

D. The researchers considered learning style of the visitor as a part of their survey by using the formative evaluation. The employed auditory stimuli, visual stimuli, and learning from peers.

E. The pertinent aspects for responding to the exhibit were the visitor's interpretation of perceived qualities as sources of feeling and meaning, the learning of vocabulary because of the signage, processing leading to speculation about the cause of environment deteriorization, and they judged their like and dislike about the exhibit.

F. They used an inductive/process approach to engaging the information, and probably the empathic.

The research in this article concerns the field evaluation technique of Formative and Summative evaluation. In this case it
was used to evaluate a museum exhibit's effectiveness in getting its messages across, and to provide information that could be used to modify or alter the exhibit. This, in practical terms, defines the concept of this technique (formative evaluation)—normally applied to "instructional materials." It is also used here, according to the authors, to provide a guide for future exhibit planning.

There are three stages of formative evaluation, according to Ken Komoski, in his article, "Formative Evaluation: the Empirical Improvement of Learning Materials," 1983, as published in the June issue of Performance & Instruction Journal. They are: (1) The one-to-one or clinical evaluation. The designer works with individual "students" to obtain data to revise the materials; (2) A small group evaluation of ten to twenty students who are representative of the target population study the materials in a "real-life" setting; (3) The field evaluation stage involves the use of the materials in a real a situation as possible, using as many students as possible (thirty or over).

In this research the author notes the use of video monitors at the beginning of an exhibit area to provide information to a visitor about what they will see, or some background data. This serves the purpose of providing what becomes the "advance organizer."

According to A. Woolfolk (1987, p. 278), "meaningful learning generally occurs when there is a potential fit between the student's schemata and the material to be learned." Following the learning theory of David Ausubel, where it is believed that people acquire
knowledge through "reception" of concepts, principles, and ideas, in a deductive way, the use of video monitors to present information at the beginning of an exhibit is known as an "advance organizer."

I would also suggest that Korenic and Young's research indicates that the exhibit design follows Jerome Bruner's "learning through discovery" principle, where the exhibit is designed so that visitors learn through their own active involvement. It was reported to be the case, however, that many people did not remember the exhibit content.

Case #2


Diamond's study concerned the need to present rocks and minerals in exhibits in a way that would reveal "fundamental properties of the natural world," where they can be "tools for science learning," and can serve as a means of discovering basic concepts of physics and geology. Diamond believes that although rocks and minerals are often displayed in a way that relates to their beauty and unusual features, it is seldom related to general scientific principles. Most mineral displays are arranged systematically, organizing them into groups with related physical properties, with chemical formulas and geographic locations. No attempt is made, she says, to "relate" this information to "things within the range of most visitors' experience."
Diamond's premise is that museums should give people the opportunity to not only see objects, but to foster learning, and exhibits should "provide concrete experiences of ideas." Citing Rene Dubos ("Sensory Perception and the Museum Experience," *Museums News*, 52/2, 1973, pp. 50-51), Diamond illustrates her point by noting:

...grand abstract statements of science do not describe how I experience the world. What I perceive with my senses and respond to with my whole being is not an abstract view of the world...If it is in the nature of our type of civilization that schools must devote more and more time to the teaching of abstract concepts, then museums have to take the educational responsibility for helping people gain a more direct perception of the world (Dubos, p. 50).

The exhibits she developed were part of the mineralogy and geology halls at the San Diego Natural History Museum, and the Cranbrook Institute of Science. Diamond introduced a model for the exhibit, and included a special area in the museum for testing that was "visible to museum visitors." Each exhibit was constructed as a rough prototype, "often the same size as the final plan," and were not mock-ups.

The exhibits, she says, were designed so that people could make sense of them intuitively without necessarily reading the copy. Design solutions had to be found for problems and questions that came up in the evaluation without relying on copy, or written information. The copy on the final version of the exhibits only told how to work the exhibit, along with a brief explanation of the phenomena being displayed.
During prototyping by an independent design/development team, 242 visitors and staff were observed in the area and other informal methods such as timing the duration of their interaction and a short interview were used, as Diamond describes it. After the design team was satisfied with a prototype more formal methods were used.

For example, evaluators selected a sample population of 220 visitors who represented the demographics of their typical audience. The sample, according to Diamond, was balanced by sex and age, with 45% being tourists and 23% of the groups contained at least one minority person. These groups were observed and interviewed in the exhibits, and the method included specific accounts of exhibit interaction, verbal information (comments on exhibit features), and how visitors responded to the copy.

In the interviews visitors were asked what they understood about the exhibits and the phenomena displayed. Interviewees were also asked to explain the exhibit from their point of view, and how they would explain the exhibit/phenomena to a child.

Diamond summarizes her findings by noting that science museum exhibit designers should be committed to creating a "range of opportunities for learning," and that "scientific and aesthetic consideration [should] focus on the perspective and experience of the visitor" (p. 7). Designers, curators and staff should be prepared to have their ideas significantly modified according to "the comments of everyday people," and the exhibit team must be innovative and creative in coming up with aesthetic solutions to
problems of this nature in science museums.

Diamond concludes by saying that the museum commitment to education should lead to exhibits that not only function to present information but provide "understandable experiences."

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Under the general principles of instructional design, this plan progressed from simple to complex in the presentation of information, and presented examples.

B. Motivation to learn, and the development of positive attitudes, the plan strives for a high probability that students will study the subject using formative evaluation, and geared exhibits to the visitor's own experiences.

C. The plan employed cognitive strategies by attempting to present concepts using examples of objects belonging to a concept class, and demonstrated principles by trying to show relationships to scientific principles, not just the beauty of the objects. There was no problem solving strategy for the visitor in any overt sense, but the exhibit plan designers set and solved problems to make a better exhibit.

D. The researchers considered the learning style of the visitor concerning information processing style, employed an
inductive process, presented concrete objects for hands-on experience, considered the fact that visitors like to move around the exhibit, and it was self-paced.

F. Concerning perceived qualities, the exhibit was designed with a visual orientation so that visitors could "discriminate" basic elements to become aware of the elements, which also led to speculating.

F. They used an inductive/process approach to perceive or interpret aspects as they related to the visitor's experience, and probably elicited an empathic response because of the purely visual qualities designed to correlate to the visitor's own experience and knowledge. The contact was interactive, allowing the handling of the object, to promote "understandable" experiences.

Prototyping as a means to increase the effectiveness and efficiency of instructional materials comes under the heading of "formative evaluation." In that regard, because Diamond first establishes the Museum as a learning environment, having an educational mission, it is logical to interpret the "exhibit" as an instructional material.

Diamond uses the survey and personal interview method of descriptive research, and went to some effort to establish a valid group of subjects as a sample, by controlling as many variables as possible.
The major effect or consequence of her research effort demonstrates Diamond's concern for the need to appeal to what I would term as the "concrete" aspect of human information processing, as opposed to the "abstract" presentation of concepts. She claims to use a method of instructional design that she says appeals to the cognitive domain for the building of schemes--aware to the need to call upon the assimilation of new information based on the past experiences/knowledge of the learner.

The exhibit that Diamond writes about also embodies the "discovery learning" technique put forth by Jerome Bruner (1986). This kind of inductive investigation leads to an understanding of the broader content contained in the exhibit. She is also using what Bruner calls "guided discovery," in my opinion, because visitors are encouraged to work with exhibit materials in a way that has been planned to reveal the connections between concepts. This theory also calls for visitors (students/learners) to make intuitive guesses, which is another feature of the Bruner learning theory, and although the outcome is "controlled," it nonetheless facilitates what I would see as a cognitive behavior.

Case #3


The purpose of this study is to provide "base-line information on what family groups do throughout the entire course of a museum
visit" (p. 139). Diamond recorded and analyzed the interactions among group members and the nature of their responses to the exhibits in Science museums. Parents and children were compared with one another across family groups to determine how their behaviors differed and how they influenced each other's behavior. Frequencies of behaviors were recorded over successive portions of the visit to look for consistent patterns of change.

Diamond asserts that "the science museum is a setting where people can learn about science and then share their experiences with family, friends, and...strangers" (p. 141). This sharing, she says, and the social circumstances that comprise it "form an essential part of the learning process in the museum" (p. 141).

Techniques used to observe families were similar to those used to study the behavior of animals in the wild, according to Diamond, known as "ethological observation." This method involves the "systematic recording of naturally occurring, ongoing behaviors and the quantitative analysis of behavioral frequencies," with the method being modified, she says, to include records of verbal interactions as well as non-verbal behaviors.

Setting. The Exploratorium and the Lawrence Hall of Science, are both "committed to innovative approaches in conveying science to the public. Both attempt to create a playful, unstructured environment," which according to Diamond, people can explore and investigate objects and natural phenomena, and "to which people can bring their own learning styles and experiences" (p. 142).
The Exploratorium's exhibits are designed to "show physical phenomena related to the theme of perception," and include such topics as optics, patterns, light, color, electricity, sound, and animal behavior. LHSs programs and exhibits include astronomy, computers, biology, earth science, optics and chemistry.

**Subjects.** These were members of family groups containing both adults and children that came to these museums as unsolicited casual visitors, according to Diamond. A total of 28 groups, 14 at each institution were observed, broken down into 22 nuclear families, 4 extended families, and 2 unrelated groups.

Diamond set criteria for the selection of groups to be studied, and this consisted of the following requirements:

- If group consisted of 3-4 people when it entered the building, with at least one child between the ages of 2-18 years and one adult.
- If group entered the building for the first time that day.
- If group did not go to a single previously specified task immediately upon entering the building.
- If group did not contain a museum employee.
- If group contained only English speaking individuals.

The group was abandoned if it did not meet all the criteria. Preference was given to a "single adult-child dyad" as the focal point for observation.

Diamond's study ensured that the subjects were representative of the population by taking an independent sample of the two
museum's visitors. She used chi-square statistics to determine any difference between study subjects and the independent samples. The study subjects were determined to be "broadly representative of the adult-child groups that visit both museums.

Observation Protocol. One group of subjects was observed per day and observation continued for the duration of the time the subjects remained in the Museum. When a group was selected the observer approached them to obtain permission. If permission was denied the observer returned to the entrance to select another group. The observer recorded:

-The speech and actions of the focal dyad, as well as other significant behaviors.
-The "temporal" [human] relationships between behaviors, both within and between individuals.
-The objects, exhibits, or other environmental stimuli that influenced the subjects.

-All interactions of the subjects with the observer

Behaviors were recorded in the form of a running narrative. The observer did not initiate any contact with the subjects but interacted if initiated by the subjects.

Analysis. The observations were recorded using 70 behavioral categories that were later reduced to 21 category groupings, according to Diamond. These were originally formulated based on a running list of behaviors observed. Frequency of behavior was computed as the proportion of total number of exhibits visited by an
individual at which behavior occurred. Frequencies were tabulated, Diamond says, with respect to social role, and was compared in a series of one-way analyses of variance (ANOVAS). Behavior frequencies were tabulated, and this data was used in a two-way ANOVAS.

**Results.** Diamond generalized her findings to obtain the following:

- Average science museum visit lasted slightly over 2 hours.
- Mean visit duration did not differ significantly between the two museums.
- 80% to 92% of the visit was spent in the exhibit area, with the remainder in the cafeteria, the museum store, restrooms or waiting area.
- Subjects appeared to "shop around" in the science museum for objects they were interested in.
- 57% of the exhibit visits lasted less than one minute.
- Progressively fewer exhibits were visited for longer durations, although this levelled off.
- 18% of the visits lasted for 3 minutes or more.

Nuclear family groups differed from non-nuclear in the behavior of "showing" at exhibits, with children and parents engaged in this activity more than children and aunts, uncles or grandparents, or unrelated adults.

Diamond also interpreted her findings into frequency analysis data, with the most common behaviors being those of approaching an
exhibit, manipulating it or observing someone else manipulating it, and then withdrawing. Observing other people manipulate the exhibits occurred as often as manipulating the exhibit.

Fathers and children were more likely to approach exhibits on their own, while mothers were more likely to approach the exhibits that family members were already observing. Children significantly manipulated more exhibits than did parents. Mothers tended to terminate exhibit interactions during the last "quarter" of the visit than at other times.

Teaching. This was demonstrated by family group members in verbal and nonverbal patterns of behavior. The category "show" was the most frequently displayed teaching behavior, which included pointing to an object, pulling someone over to an object or exhibit, or handing an object to someone, and occurred at 13% of the exhibits. Telling occurred at 9%. Telling and showing were displayed with more frequency by parents than by children to parents.

Parents appeared to make use of the exhibit graphics for teaching purposes, especially Diamond says to "supplement their own knowledge of the exhibit." Parents tended to read the graphics aloud to their children.

Conclusions. Diamond concludes that learning in a science museum does not occur only as a result of the interaction between individual visitors and the exhibits, but in the context of "social interactions." Teaching occurs as a "fundamental aspect...of
spontaneous interactions of family members" (p. 152). Teaching not only provides information about the exhibit but influences the attitudes of the people as they interact, according to Diamond.

The study shows that "...the model of the science museum as a continuous and evenly-paced flow of events may be inappropriate" (p. 140). The choice of "high interest" exhibits appears to be idiosyncratic, and these are extensively used. Graphics use in a science museum suggests that to the degree to which graphics can be made understandable, they significantly influence learning at exhibits.

Critical Analysis.

Although this case study did not specifically involve the design and evaluation of the exhibit, it did in effect measure the effectiveness of the design. Moreover it provides some data on how people appear to engage exhibit information for learning from the very important social perspective.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. I believe that it demonstrates the novel and attention getting objective because it was clear that the museum visitors observed were draw to the interactive exhibits. Even though the content was designed for flow, people wandered around and self-selected.

B. Concerning attitudes and motivation, there were obvious
positive attitudes developed because of the recorded family interaction. This is particularly significant for the museum exhibit design thinking because parents were able to grasp the information presented and relate that to the visual information in meaningful ways. This also leads to modeling of behaviors for attending to the exhibits.

C. Concept Learning. Apparently presented clear and concrete examples of objects, they were able to demonstrate principles, and provided practice and feedback. There does not appear to be any problem solving activity for visitors, but certainly for the research team.

D. Learning Style. The exhibits were designed for information processing styles such as being self-paced, inductive, hand-on, and interactive. Social needs were clearly evident for those preferring or predisposed to learn from family and peers.

E. There were evident multi-sensory associations by the responses noted to the objects involving interaction, verbal and visual. Visitor's relied on personal preferences.

F. Visitor's physically and intellectually interacted with the exhibits, the family taught each other, and there were group discussions.

Generally, the primary focus of this example of research by Diamond concerns what is known as "observational learning" where the "observer imitates the behavior of a model, even though the "model"
receives no reinforcement or punishment while the observer is watching (Woolfolk, 1987, p. 187). Based on the behavioral (what a person does in a given situation) theory of Albert Bandura, observational learning is a key element of the "social cognitive theory," where we learn by observing and imitating others, in this case in the museum from family groups.

The application in the museum would be that the family members are modeling after one another, in my view, and assuming and exchanging their social/familiar roles as teacher and student or learner. I believe that it is also important to note that Diamond found that people observed others manipulating an exhibit almost to the same extent that they manipulated it themselves.

Woolfolk (1987, pp. 184-85) cites from Bandura, ("Social Foundations of Thought and Action," Prentice-Hall) and indicates that there are four elements to be considered in "observational learning." They are:

- **Attention.** Persons may pay attention to parents, older brothers and sisters, or to "high-status models" like TV idols. Diamond's exhibit used lights, sounds, and colors to attract the attention of visitors, along with manipulative exhibits which provided a stimulus and response interaction.

- **Retention.** In order to imitate the model you have to remember it, and actual practice is a way to do this. In the museum example, children were modeling the behavior of parents, and were also engaged in actively working with the exhibits
(although Diamond's results seemed to show that not many
remembered the science information or concept in the exhibit).

-Production. Knowing how a behavior should look, and
remembering the steps may not ensure smooth performance so
practice, feedback and coaching is required.

-Motivation or Reinforcement. Although one may acquire the new
skill or behavior it may not be performed until there is
incentive to do so. Positive reinforcement, acquisition of
new knowledge, or just the simple pleasure of getting a
response (which is what Diamond's article seems to suggest)
would be a positive behavioral activity.

In my view, Diamond's research in this instance indicates that
the exhibit design follows Jerome Bruner's "learning through
discovery" principle, where the exhibit (as the "text" which
contains the information) is designed so that visitors learn through
their own active involvement. It also seems that there was an
attempt to provide the potential learner with a sequence that builds
in the amount and complexity of the information given.

In summary, although it was the case that some people reported
not remembering the exhibit content it does appear that there was
ample "opportunity" for the visitor to engage the information. Even
though the exhibit was carefully designed to be provide for a
"learning" experience, it seems that perhaps the exhibit would
benefit from some human "teaching" intervention techniques, either
by docents, staff or by employing other didactic approaches.
Case #4


"What Research Says about Learning in Science Museums" is the sub-title of this article, and asks the question, "what kind of experience is uniquely available in science museums that parallels the esthetic experience art museums offer?

Chambers asserts that the "aha" experiences many science museums now offer visitors resemble traditional science education demonstrations that were driven by the "information they purport to teach, rather than by visitor's motivational needs." She says the research that has led to a new "experience-driven interpretive model" for art museums may also have something fruitful to say to science museums.

Chambers and her team undertook research at the Denver Art Museum to "identify the nature of art novices' esthetic experience" in order to understand how these resembled and differed from those of experts. According to the findings, by analyzing novices' perceptions of their art experiences, Chambers indicates that she was able to identify "skills and attitudes they need to develop if their experiences with art objects are to be enriched." The study allowed the researchers to take novices' preconceptions and preferences about art into account, in their effort to develop experience-driven interpretive materials.
According to Chambers, the objective of the study was to understand the "kind of experience we want to promote and the conditions necessary" to promote an "intrinsic-motivation model," based on research in behavioral psychology. The purpose was to investigate the "flow" that describes the "deep involvement and effortless progression" experts feel when an activity goes well, and that which thus motivates them to spend time pursuing something based solely on the act itself.

Her findings revealed that there are three conditions critical to her concept of "flow": (1) the tasks must be equal to one's present ability to perform, (2) attention must be centered on a limited stimulus field, and (3) usually, the experience must contain "coherent, noncontradictory demands for action and provide clear, unambiguous feedback."

According to the author, museum-going is a "freely chosen activity, with no other reward than the activity itself." Her supposition was that if experiences in museums are regarded as varieties of flow experience, then offering challenges equal to the novice's current skills may facilitate discoveries that "share in the nature of the expert's flow experience," says Chambers.

What kind of experience is uniquely available in science museums that parallels the aesthetic experience art museums offer? When Science museums rigidly control the outcomes of their "discovery" activities, they are really offering visitors and experience carefully calculated to "prove" established facts or
principles--illustrated examples of what one should know rather than opportunities to explore what science is, or how it works. As long as Science museums continue to tie their "aha!" experiences directly to teaching specific facts or principles, their exhibits will remain information driven and not experience driven.

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Although one cannot identify any reference to instructional design in this report, it is clear that the visitor is being given relevant information, etc. in the effort to reach specific outcomes.

B. The purpose of the research was to determine the motivational need of the visitor, and establish a baseline to reach some level of self motivation to explore learning opportunities.

C. I assume that the researcher was striving to present the visitor with the broader concept of what the science exhibit addressed, so that learners could go beyond the standard objectives, and so would be engaging in a cognitive process for applying the information. She called on the science museum to not "rigidly control" the outcomes.

D. The research was considering the "behavioral" needs of the visitor to arrive at what was termed an
"intrinsic-motivational model."

E. In this study, the researcher was calling for the museum visitor to be able to engage in an "aesthetical" type experience, to speculate on outcomes, and to synthesize the data presented.

F. I believe that this type of approach would lead to an empathic response, calling upon the experience and knowledge of the visitor, who would also be called upon to get imaginatively involved.

Although this article does not seem to offer many solutions to the questions it raises, in my view it does articulate several unique points that are not often discussed in the science museum literature. One, is that a science museum education professional considers it important to provide visitors with an aesthetic experience in the science museum. Two, is the open statement that of the perspective that science museums only "teach" to certain tried and true outcomes, and thus dogmatically control the "aha" experience without apparently considering any other potential. This is unlike the Art museum, where we perceive no outcome agenda other than "appreciation." Three, the notion that since "museum going is a reward unto itself," science museum planners would do well to capitalize on the intrinsic "aha" aspect of the museum experience. Four, that the science museum is interested in diverging from their perceived mission (which they do very well) to provide an
"experience-driven interpretive model" patterned after that believed to be found in the art museum.

In her effort to conduct educational research that would reveal parameters for establishing a base-line for an intrinsic-motivational model, Chambers is describing what Robert Gagne (1977) refers to, in my view, when he says that "learning also results in the establishment of internal states that influence the individual's choices of personal action" (p. 219). These outcomes of learning, according to Gagne, are called "attitudes."

Attitudes, he goes on to say, do not determine particular actions but make "certain classes of individual action more or less probable." When Chambers talks about the "aha" experience and likens it to the so-called aesthetic response (noted to occasionally occur in the art museum from art objects), wanting to explore the "flow" of particular responses that come from experts, I believe that Gagne's description of an "internal state" comes closer to what she desires as an obtainable outcome. And, this is particularly applicable to Chamber's stated objective of providing the museum visitor with something other than a controlled discovery experience.

In my opinion, Chambers operational agenda is better described as being one where she is able to design a science museum experience that has affective objectives (possibly along with providing what Gagne refers to as an "intellectual" and "motor skills" capability—as a part of the continuum that includes "attitudes"). This is different than what we would associate as being available in
a science museum environment, although many "discovery type" science museums emphasize "fun" as a means of getting and sustaining the attention of the visitor--an essential element of learning, and no less an aspect or result in a cognitive frame where we build on attitudinal schemes as we encounter and learn about them through the assimilation of input events.

Although in the science museum we typically expect to find people manipulating mechanical objects, or observing physical phenomena in pursuit of what I would judge to be an "intellectual" outcome (in this case using a method by where one learns something about a phenomenon by engaging in "play"), I would speculate that there is not going to be a real or imagined "novice" aesthetic response as we think of it in the art museum, by listening to music, or when seeing a landscape. In fact, the pure beauty of scientific phenomena would seem to be truly reserved for those who have a full and in depth grasp of science, and thus Chambers' use of the "aha" experience may be a misnomer if we take her message in the very literal sense that I believe she intends.

For that reason I would speculate that it is this confusion of terms (and perhaps not the desire for a particular outcome--for appreciation juxtaposed against a desire for the learner to gain scientific insight) that appears to elicit the non-aesthetic response affecting the "behavioral" motivation that she writes about. Not all "aesthetic" responses in the art museum provide for understanding and insight. If, on the other hand, one considers
attitudinal goals to be the desired outcome (coming to grips with the terminology used in the educational field) one could begin to articulate a method by which to elicit the sought after condition Chambers desires for what she calls an "intrinsic" behavioral model. Going to the science museum for a more abstract, aesthetic and affective "aha" type experience could be the benefit of Chambers' research, and possibly define (if desired) an entirely different audience for this venue--which is what I believe Chambers sets out to do. This is similar to the Art museum wanting to open its doors to a broader audience who begins to deal with the objects in a variety of ways, in my opinion.

One of Gagne's examples (1977, p. 219) that he uses to illustrate the concept of "attitude" is that of a lathe operator, who along with possessing the cognitive and motor skills to produce a steel rod, also exhibits an "attitude of precision" toward the task. Per Chambers notion about the art museum experience, it is the case that many people see craftsmanship as having both a motor skill and an aesthetic base for appreciation, and thus as the craftsman masters the intellectual and motor skills domains for performance, he may also develop the internal state likened to an appreciation for the beauty in an utilitarian object.
Case #5


McNamara is director of evaluation at the Science Museum of Virginia, and says that chances for making exhibits more effective can be increased by "paying more attention to what is already known about how people learn in museums and by simply trying out exhibit ideas with real visitors as the exhibit is developing."

Psychological and educational research has a long tradition in museums, she says, and sixty years ago researchers began examining the behavior of art museum visitors under a variety of conditions. Recent studies ranging from descriptive to the analysis of how specific exhibit features, such as display techniques or opportunities for hands-on interaction affect visitor behavior, "have had surprisingly little impact on the development of exhibits."

"No reliable general theories yet exist to predict how visitors will respond to exhibit features in a variety of museum settings" (p. 20), and some research findings concerning the short time that visitors spend at displays has made many exhibit designers "pessimistic" about the real educational potential of museums.

McNamara goes on to say that in the absence of useful theories about how visitors learn in museums, exhibits can continue to be improved by pragmatic and empirical methodologies. She calls for the careful and systematic investigation of the relationships between
visitors and exhibits in each museum as an alternative. McNamara suggests the use of:

- Goal referenced research techniques to improve an exhibit's communication effectiveness.
- The control of variables, large sample sizes, and attention to statistical significance that characterize many kinds of research activity.
- To produce exhibits that are more effective from the visitor's viewpoint, think about exhibit outcomes in terms of specific and observable visitor behaviors.
- Writing behavioral objectives during and after exhibit development, and for use by exhibit team members.

When engaging in the study of "prototyping," it is advisable to observe that visitors actually do in order to predict their behavior. This can be done with a model of the exhibit. Researchers could develop shorthand codes to document this behavior.

Other methods to employ include:

- Visitor interviews should be uncomplicated and brief, such as "what do you think the exhibit is about?" Exhibits that do not prompt an appropriate reply will not be effective.
- The cycle of information gathering and exhibit change should be continued until the exhibit is either abandoned or communicates effectively.
- The majority of prototype exhibits that McNamara develops are "initially effective" for 10% or less of their
audience. That proportion dramatically rises with the first few modifications tried. Testing should continue until there is a diminishing return.

A prototype modified until it is effective results in a more permanent version that is at least as effective.

McNamara concludes that "formative" or prototype testing can quickly identify exhibit weaknesses and failures in terms of communication, only the exhibit developers can suggest what would be better. The insights obtained are "invaluable" however to the creativity and efficiency of the design teams.

The "failure of visitors to learn from exhibits is not merely a philosophical issue," according to the author. Although the "views of visitors" may be in conflict" with museum management because of the extra cost, it can be more "expensive" in the long run if visitors fail to come to the museum.

**Critical Analysis.**

This case study report does not really describe an exhibit, but it does touch on several of the features that I have described in my criteria, synthesized from outside the museum field. Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. No real discussion of design principles as to content.

B. Attitudes and motivation. Calls for the setting of goals in exhibit design, and for the continuous evaluation of
visitor behavior. As visitors find positive reinforcement, they would develop positive attitudes about the exhibit—particularly as they become aware that the designer is modifying aspects to suit their likes/dislikes.

C. The designers are engaging in problem solving, but we don't have any data on visitor.

D. Considering learning style of the visitor is evident, in my opinion because the exhibit designer is willing to observe their behavior and modify the plan accordingly.

E. Again, the report indicates an adherence to the setting of behavioral objectives and goals based on empirical evidence, indicating a strong consideration for the way the visitor processes exhibit information.

F. There is no evidence for a response to this question, but we do know that visitors are being interviewed about their likes and dislikes—which could be indicative of how they approached the content.

Clearly McNamara is concerned with formative evaluation for prototyping exhibits in order to "produce exhibits that are more effective from the visitor's viewpoint." Although this article does not explore any parameters for "effectiveness," it does offer a ready guide, or at least some encouragement, to fellow professionals.

Central to the theme of my analysis perspective in this investigation, McNamara points out as a working museum educator (evaluator) that there is "no reliable general theory" that can
predict how visitors will respond to exhibit features that can be
applied to a "variety of museum settings." She goes on to say that
many museum educators are in fact "pessimistic" about any real
educational outcomes that may occur in these environments.

McNamara reports that she uses descriptive research techniques
with the use of statistical significance data, sample sizes and the
control of variables to measure local populations. Here I would
suggest that perhaps she could engage in the use of the case study
method of research, for example, which would allow her to compare
her findings with those of other museums in the field, and thus come
to some understanding of how her research results compare to other
museums of similar and like type. She could also introduce her own
variables—what did they do in another museum—in her museum to see
if similar responses occur.

Her mention of the writing of behavioral objectives suggests
the use of instructional design techniques, such as those
articulated by Dick and Carey in their book, "The Systematic Design
of Instruction" (1985, Scott-Foresman). I note this because she is
limiting herself to her own local audience which should prove to be
somewhat homogeneous, particularly over a period of time—such as
could be determined in a linear study of local school children, for
example.

She could apply principles concerning audience characteristics,
i.e. what skills they have coming to the museum and what skills or
knowledge they need to reach the objectives she indicates she sets.
Since she does seem to concentrate on her own environment, and since science museums are fairly static in terms of exhibits (little change) she could also apply instructional design techniques that would build on previous knowledge, and attempt to design new facets of exhibits that would expand the visitors concept or understanding of phenomena.

Such research over a period of time, adequately measured, may produce the model she seeks.

**Case #6**


Screven states that how the physical design [of exhibits] affects the motivational, perceptual, affective, and learning potentials of the visitor is "less well understood by museum and exhibit planners," than how to design the aesthetic aspects. There are important differences between formal learning settings, such as schools, and the informal settings of museum environments, which are "nonlinear, self-paced, voluntary, and exploratory." He also points out that in schools the primary teaching tool is the teacher supported by verbal media, and in the museum the primary teaching tool is the exhibit, supported by objects and other visual media.

He goes on to say that unguided museum audiences are "leisure audiences" who interact with exhibits on a "voluntary basis" and on their own terms. They learn by "paying attention to exhibit
content, noticing details, making comparisons, reading explanatory text, or following instructions."

Public audiences, he points out, vary in age, education, interests, attitudes, preconceptions about what they see, and the time they have available. They also have a diversity of skills, interests, knowledge and motivations.

Visitor expectations and behavior also varies, with some moving quickly through exhibits, physically covering everything and seldom stopping at anything for very long. Others "wander...aimlessly" but do stop at what interests them. Many, he says, "devote considerable time and effort to exhibits with good organization and fun elements" (p. 113). There is even a "relatively small" group of scholars, hobbyists, and students who have specific interests and goals. Most non-scholar visitors have several features in common, according to Screven. They are:

-Better education and higher socioeconomic levels than the general population, although most are not prepared to understand what they seen in the museum.

-Social and family orientations, most coming in small groups of two to three. The educational "productivity" of an exhibit may depend on how it supports these social motivations.

-Visual orientation where high priority elements such as live organisms, objects that move and invite sensory involvement (touching, manipulation), novelty and novel configurations.
Low priority visuals include two-dimensional wall panels and traditional text.

- Novelty seeking, where visitors attend to elements that are moderately unique or that form "unexpected configurations." Familiar objects attract when "out of context." play a social role, have media importance, have priority features such as movement.

Screven states that a "poor knowledge of the public" results in either over or under-estimating the knowledge, attitudes, interests, and expectations. Overloading the visitor with information of the wrong kind is detrimental to their learning, and experiences must be positive in this voluntary learner environment.

In order to describe planning concepts and procedures for exhibits, along with some psychological and behavioral considerations, Screven addresses the following topics:

-Audience analysis.

-Visitor motivation (factors that encourage/discourage visitor attention, time, and effort).

-Concept networks and learning hierarchies (conceptual frameworks for exhibit planning).

-Evaluation as a tool for design planning.

-Visitor orientation (spatial and conceptual organizers that prepare visitors for viewing exhibits).

-Labels (uses and misuses, motivations for reading and not
reading, layering, information maps, questions).

-Computer applications.

**Audience Analysis.** Screven indicates that the exhibit must begin with the visitor in order to be productive in terms of learning and interest. This analysis should provide: an understanding of visitor knowledge, attitudes, expectations, and misconceptions concerning the exhibition's potential content; an objective basis for estimating where and how to convey important information; a basis for motivating audiences to attend to and spend time with key exhibit elements; and a point of departure for determining which messages are important for particular audiences, and how to focus, sequence and illustrate this information.

Information on visitor entering skills (reading levels), entering knowledge on exhibit topics, misconceptions, biases, perceptual sets, curiosities, time constraints and activities likely to be "rewarding" can be obtained by the use of structured and open ended interviews, pre-testing of visitor samples on exhibit topics, talking to visitors about their expectations, and observing behaviors in the exhibit space. Audience analysis should begin before exhibit planning.

**Visitor motivation.** Screven states that getting visitors to interact with the substantive content of exhibits is as important as the content itself. Motivation involves intrinsic and extrinsic characteristics that encourage visitors to attend, follow instructions, cooperate, and return. Intrinsic motivators include
usefulness, coherence of content, timeliness, personal meaning, he opportunity to interact with an exhibit, and the element of surprise or challenge. Extrinsic motivators include feedback about visual content/questions, tokens, scores or privileges for achievement.

One way to achieve the linkage between communication objectives and the intrinsic exploratory, social and recreational interests is to make fun elements of exhibits dependent on attending and learning. Pushing buttons and obtaining a correct choice is a positive learning experience according to Screven.

The interactive, adaptive features of computers can serve to motivate and guide visitor usage of exhibit content, and can become an individual exhibit itself, providing background concepts, orientation, or simulations of exhibit themes.

Although "linear sequencing" of topics is sometimes necessary to present hierarchical ideas that depend on one another, caution should be used because many visitors require the fun of exploration to remain motivated.

Concept networks. These express the "logical organization of a given topic, such as major elements, causal relationships, processes, generalizations, principles, and applications. They do not necessarily, says Screven, represent the topics for detailed exhibit treatment, but are a framework for planners to help identify key concepts.

Concept networks identify important things to be communicated and the interrelationships between basic elements, he goes on to
say. They structure and order exhibit content into a coherent order of ideas.

Screven (1986) cites Gagne (1977), and his learning hierarchy of eight types of learning that he believes is pertinent to the museum: signal learning or conditioned reflexes; (a) instrumental (operant) learning, where a reader continues to read a label because it is providing useful information; (b) motor chaining, such as learning to play a melody on a piano; (c) verbal chaining, such as learning to recite a poem (fixed sequence); (d) multiple discrimination, as in the ability to recall regardless of sequence—a visitor can identify a painting style from any order of presentation; (e) concept learning, or the ability to group or name a class of objects, events, or symbols that differ among themselves on some common characteristic, acquired through repeated exposure to sequences of examples and nonexamples; (f) rule learning, the ability to use a rule that defines a concept by stating the rule or using it on new examples; and (g) problem solving, an extension of rule learning where rules are put together addressing new problems.

Exhibits can foster divergent and convergent thinking, i.e. exhibits do not have to be information giving, they can also change visitor attitudes, stimulate interests or sensitize visitors to new ideas.

**Evaluation.** According to Screven, research on the impact of educational exhibits on viewer interest and learning reveals that they are not as productive as planners suppose. Formative
evaluation provides the most effective way to plan for educational outcomes by increasing the likelihood that exhibits will work as intended, replace design decisions based on hypothetical audiences, identifies approaches that are unlikely to work, avoids the cost of later changes.

Visitor orientation: advance organizers. These can be conceptual, such as overviews of what can be seen, what can be learned, or topographic pre-organizers such as maps. There are also post-organizers, according to Screven, which can reinforce key elements of what has already been seen.

Labels and interpretive text. Labels serve four important functions in helping the visitor interpret or understand the exhibit content:

- Provide information about the visual content, names, dates how it was made.
- Provide instructions on what to do, what to look for, what to compare.
- Interpret objects or processes.
- Describe or direct attention to other examples of the same process.

Computer applications. Screven (1986) says that computers are adaptable to many motivational and cognitive support functions such as: advance organizing devices, orientation systems, and time schedulers. They can also be used as resources for motivating
voluntary exploration and learning from exhibits by linking visitor attention to exhibit content.

**Critical Analysis.**

The article by Screven (a psychologist by training) runs a gamut of information about museum exhibits and learning, as promised in the title, from audience analysis to labelling and evaluation tools that can be employed. Screven cites several of the primary contributors to the learning field, including Ausubel and Gagne, and follows Gagne's principles on learning "hierarchies," that he interpolates into Museum terms. Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Covers this material.

B. Covers this material, adding that the exhibit does not always have to be information giving but can shape attitudes.

C. Covers this material concerning cognitive approaches.

D. Concludes that the exhibit begins with the visitor.

E. Covers this material.

F. Covers this material, and although Screven seems to be addressing himself to the science museum environment, his perceptions, like my guideline, are fruitfully adaptable to the art museum.
As is evidenced by my outline, Screven offers the museum professional very concrete advice about the use of evaluation (as a formative evaluation technique), and considers in a step-by-step fashion what "motivates" a person to "attend" to an exhibit, and how one "engages" it with the desired effect of causing the visitor to continue to participate in the exhibit, and to ultimately want to return to the museum for more information. And, it does so in a manner that pegs theory to content; albeit Screven does not cite the theory from which he draws (making it sound as though it is an original thought) and his advice would be more valid and potentially useful to the novice if he did.

From a critical point of view the article by Screven is interesting because it is so thoroughly useful, based on my current research and analysis of the museum education field, and in my opinion. It seems to have absolute utility for the science museum environment, and could be adapted for use by the art museum setting—as I hope to be able to demonstrate in this paper.

Even though this article was published in 1986, current museum literature (late 1991) fails to embrace Screven's advice, or at least fails to acknowledge any similar findings all-of-a-piece.

Case #7

K. Wonders, "The Illusionary Art of Background Painting in Habitat Dioramas," Curator, 33/2 1990, pp. 90-117.

Wonders states that "habitat dioramas transcend the limitations
of a didactic vehicle for conveying scientific facts," and "capture
the viewer's attention by evoking an illusion of the real scene as
viewed through a window." She goes on to state that in 1917 the
dioramas in the Hall of North American Mammals at the California
Academy of Sciences were described as "scenes of artistic beauty
[that] unconsciously instruct the spectator" ("Where Science Joins

Wonders says that the diorama is sometimes seen by museum
professionals as "more important for the esthetic pleasure it gives
than for the amount of significance of the information that it
adds," and that many feel that the aesthetic experience has no place
in the natural history museum. Citing E.H. Gombrich ("The Sky is
the Limit," The Image and the Eye, Phaidon, 1982, pp. 162-171), she
says that the diorama is derived from the spherical orientation of
man's visual perception, or the "non-existent vault of heaven"
phenomenon, where is produced the effect of realistic distance and
space.

Wonders goes on to show that many early diorama designers
borrowed illusionary techniques from Daguerre, who used real objects
with painting, mixing nature and art, and says that today however it
is usually only the scientists that object to these techniques in
the "museum context." The diorama artist is successful, she goes on
to say, if "the viewer loses his perceptual ability to distinguish
between reality and the scene before him," even for an instant.
According to the author, dioramas and panoramas were a success because of their "capacity to instruct while simultaneously providing visual amusement" (p. 92). Citing John Ruskin a 19th century art critic, she says that pictures of foreign scenery had a special appeal for the public who had little opportunity to travel abroad. Ruskin went on to "pronounce" them as an "educational institution" of the "highest and purest value."

Dioramas were historically an integral part of "a new educational program in public museums," as one of the most effective means of "communicating a direct experience of nature."

Wonders says that:

Habitat dioramas document a uniquely North American attitude toward the disappearing wilderness. They can be considered a continuation of the fine arts convention established by the American school of nineteenth-century panoramic landscape painting, which was based on the utilitarian function of the topographical view, the veristic aesthetic of truth to nature, the illusionistic portrayal of nature as spectacle, and landscape painting as reportage. Thus dioramas should be interpreted not only as a museum exhibition technique but as an art form embedded in North America's social and cultural history (p. 96).

The true pedagogic potential of the diorama technique cannot be evaluated without more effort toward understanding how visual perception works in the habitat diorama and why a greater aesthetic sense of the beauty and complexity of nature is fundamental to achieving a fuller knowledge of natural history, says Wonders.

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter
II (A-F), I find the following to be true of this example:

A. The novel experience of the "you are there" phenomenon, where one actually loses the sense of what is real, would be one of the key attention getting features of the diorama. Organizers are being presented because the context of the exhibit, i.e. the diorama space organizes what the viewer will see. The researcher in this case uses the word didactic but in many ways the educational effectiveness is lost to the passivity of the information. Note here that since the information appears "real" rather than symbolic, as in a painting in the art museum, it would have the effect of being more readily "read."

B. Motivation. Certainly the diorama offers the visitor the unique opportunity to learn more about foreign habitats, including plants and animals, and in a way that is easily accessed due to the "real" nature of the representation. This would foster a positive attitude.

C. Concept building. Being able to present context is effective, but is may be true that only showing one example of an animal or a plant does not provide clues to a class. It would excel at presenting the larger context, by being able to demonstrate how the plant or animal fits into the environment depicted. There is no problem solving strategy apparent in this example, but this method of exhibit design seems to be ideal for questioning strategies that require
the observing of data and drawing conclusions, or for group
discussions and the use of teaching materials.

D. This examples demonstrates the information processing styles
to good effect, particularly illustrating the self-paced
learning perspective, the presentation of auditory, visual,
and printed stimuli, and the physical and emotional need
category—as noted by the author regarding the aesthetic
response.

E. Certainly the diorama allows the visitor to perceive
obvious and subtle qualities, the harshness of an outdoor
environment, the flight of a bird, or the beauty of nature.
The diorama certainly provides for an opportunity to
directly "interpret" perceived qualities as a source of
feeling and meaning; because of the "real" representation.

F. The diorama provides the opportunity for a deductive
approach to coming to grips with the information because its
precise strength is in the overall depiction of an
environment—rather than single isolated elements.
Certainly the diorama elicits the empathic approach and
involvement, where people can readily call upon their own
experiences to draws conclusions about what they see.

Concepts are general categories of ideas, objects, people, or
experiences whose members show certain properties. Among cognitive
approaches to learning, emphasis is on how people perceive,
understand and remember information. Dioramas present information
that represents "real life" visual data which provides both context and concept for the learner. Concepts are abstractions and only the individual example exists.

Context is a part of a remembering continuum that also includes the components of elaboration and organization. Aspects of physical context such as places, rooms, settings are learned along with other information. Putting something in context lets you know what came before and after an event, and helps you to better understand the new information that is being presented (Woolfolk, 1987, p. 253).

Concepts help people to organize vast amounts of information into meaningful units. Robert Gagne in his book entitled "The Conditions of Learning," (1977, p. 89) writes that "the learning of capabilities," and sets of associations (or sets of chains) may "become increasingly differentiated in the sense that individual members become more readily distinguishable from one another." He utilizes "concepts" as a part of his cognitive theory of learning and offers a simple example of a set of three keys, which look and feel alike but open different doors. Soon, he says, the individual can begin to tell them apart. Then, as the individual responds to a specific collection of keys as door keys and to a new set of keys as padlock keys, when a new key is introduced he may then be able to identify this "entirely different key as belonging to one of these categories."

The diorama in this example showed varieties of birds and varieties of animals as being a part of this outdoor environment,
and so the larger "concept" being presented to the visitor becomes "habitat" or environment rather than each individual bird or animal. And conversely, we begin to understand more about the birds and animals in the "context" of the habitat. Once these fundamental distinctions have been made the learner may then become capable of responding to "stimulus objects" as members of a common class or category, according to Gagne.

For my purpose, and in terms of the exhibit in question, seeing a bird, a bear, or a mountain lion "out of context" wouldn't tell the viewer anything about all those factors that would have contributed to an understanding of the information. Dioramas offer the museum visitor an opportunity to see an animal in its "natural habitat" and give us a great amount of "concrete" visual information (vs. abstract information out of context), and in a way that can be "read" and understood by virtually all age groups.

Case #8


According to Wood, science museums developed in the 60s based on San Francisco's Exploratorium featured large exhibit spaces. The Omniplex followed this style, and although they were initially found to be exciting and appreciated by young and old visitors, the "hands-on" type exhibits were neither appropriate or appealing to very young museum goers.
This realization led to the idea of a "discovery room," which was child-oriented in a science discovery environment. The space made specimens available to the public that encouraged handling and investigation, even though they required some care and supervision.

The room was designed with "scaled-down" exhibits modeled after those found in the main exhibit hall. The Curator of the room recorded attendance during peak museum hours and collected data on visitors by age group. Randomly selected visitors were asked to respond to a questionnaire to determine which objects in the Room were most "enjoyed" and which best "aroused" their curiosity, according to Wood. She says that adults expressed surprise that touching was encouraged.

Some immediate results were that members of the public expressed a desire to donate objects from their own collections for the room. Interest in the fossils prompted the museum to add "paleoplaques" (three dimensional graphics of prehistoric animals) which were displayed next to a timeline. Three dimensional landform models were added to the display of rocks and minerals, and a stereoscopic microscope was added for children to use.

The "discovery room" is not open on a continuous basis but is scheduled for school groups. Several methods are used to engage children in learning. They are:

- Children are encouraged to make observations.
- Encouraged to match replicas of objects with information provided and draw their own conclusions.
-Children are encouraged to seek answers from objects, small collections, and readily accessible science books without a teacher present.

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Novelty and attention getting is the main goal of this exhibit by offering normally protected objects for handling. Content was organized for simple and concrete experiences.

B. Motivation and attitude. Learners experienced success and accomplishment through positive acceptance of their use of the exhibit materials.

C. Cognitive learning was in evidence, such as relating fossils to a timeline, presentation of clear, unambiguous examples of objects, encouragement to engage in problem solving, learned relationships among concepts, provided direction and guidance in a "discovery" process.

D. Considered learner because they created the special, hands on, simple environment geared to young learners, as an information processing style. Encouraged learning by process or inductive exploration.

E. Able to perceive obvious qualities of the object, and basic properties. They developed perceived qualities by encouraging speculative approach to understanding.
F. Used inductive approach and perceived the relationship between elements. The children were encouraged to notice elements that they would not have in the regular environment.

The idea of tailoring a special "room" for a specific age group (child vs. adult) considers particular developmental learning styles. This type of hands-on exploration format could surely be thought of as fitting into Piaget's "concrete operational stage" of cognitive development. This "stage" is typified by the ability to "solve concrete or hands-on problems, according to B.J. Wadsworth (1979, "Piaget's theory of cognitive development," New York: Longman). The age group for this stage theoretically ranges from age 7-11.

Concrete operational also involves the ability to "classify," in which the student is able to "focus on a single characteristic of objects in a set," and then group these objects based on a single characteristic. In the discovery room example Wood introduced actual fossils along with the reproduction copies (the "paleopaques") juxtaposed against a time line. The children using the exhibit were thus able to understand and work with a "concept" of what fossils represented in the study of science, and were further working with the "abstract" notion of a reproduction which stood for a real fossil. This would have the effect of helping them to move from concrete to the formal operational stage.
Howard Gardner, in his book "Frames of Mind" (1983, p. 131), in writing about logical-mathematical intelligence with reference to the stage theory of Piaget says that, "...the child's initial appreciation of causal relations and his first efforts to classify objects consistently--are also manifest at first through observation and manipulation," of physical objects. He goes on to complete the thought by stating that "all logical-mathematical forms of intelligence inheres initially in the handling of objects."

After a time, Gardner goes on to say, "such actions can be conducted mentally," and after a time the "actions" become internalized. The child need not touch the objects himself, "he can simply make the required comparisons, additions, or deletions," in his head, and these operations "become increasingly certain." Thus the child in Wood's "discovery room" finds a relatively ideal simple yet complex learning environment.

Case #9

COSI, KIDSPORTS, proposal and plan for a new science exhibit, 1989, Columbus, Ohio.

The following analysis is based on a full proposal for a new exhibit at the Columbus Center Of Science and Industry. The proposal document was provided to me by the education staff and the Curator of the "Kidspace" division while doing an internship on the application of learning theory to the museum setting in an empirical study.
The stated purpose of this exhibit is to make "real-world connections with scientific principals between science and health for kids." Through hands-on participation, kids are certain to "touch and be touched by the science and technology of sports." The exhibition KIDSPORTS "can effectively reduce science illiteracy and provide practical relevance to scientific and health related principles," according to the proposal. The exhibit is designed to serve 8-13 year old children.

The document further states that the general mission of COSI KIDSPACE is to serve as a "child-focused" area that contains exhibits "just their size" which children can actively explore. KIDSPACE encourages mastery and competence in the young child, and encourages peer interaction and facilitate 8 to 13 year-olds movement "away from the egocentrism of early childhood and closer to the flexibility of adulthood."

The KIDSPORTS exhibit is based on the philosophy that "kids learn best by actively exploring and interacting with their environment using all of their senses," according to the text. Eight to thirteen year olds "strive to attain a sense of self-efficacy" which is a flexible self confidence that serves them in a variety of situations. Several elements in the exhibit are designed to provide kids the tools they need to attain the state of security, encouragement, and challenge.

In the exhibit there is no "right or wrong," and the emphasis is on self-discovery which is self-directed at ones own pace. Each
exhibit contains an aspect of "inactive attainment" such as a visual enticement in the form of photos of sports heroes/heroines. Color and size of exhibits are said to appeal to this age group.

The "demands" on skill level are basic so that all kids will feel comfortable about participating. The exhibits call upon pre-existing skills that they can use to discover new experiences, and it is anticipated that seeing others use the exhibit will encourage hesitant children. Signage encourages kids to try new tasks without being judged, removing the "anxiety of competing" with adults or peer groups standards of behavior.

Proposed exhibits were as follows:

- **Locker room.** Contains a variety of team uniforms that can be tried on.

- **Uniform Technology.** Role playing is the objective, with uniforms and equipment from different sports.

- **Weight.** Kids weigh themselves and understand how it effects "impact, momentum, and reaction time."

- **Impact & Momentum.** Kids experience impact by jumping to understand their force of impact in comparison to their weight.

- **Height.** Heights affect participation in sports, and kids are encouraged to compare their height to vertical jump.

- **Vertical jump.** Kids discover the mechanics of jumping as a measure of athletic training and ability.

- **Sports technology.** Materials research--breakaway basket ball
hoops, reinforced back boards.

-Balance. Kids climb a balance board with a safety rail with a trigger that tells them how long they stayed stable.

-Aerobics. Computer amplified synthesizer walls with photo-cells make music based on motion. Designed to help kids "refine their large motor skills, and develop "finesse" skills of rhythm and balance.

-Power. Levers to provide mechanical advantage. Kids use a fulcrum to lift their parents.

-Reaction time. Kids measure their coordination and conditioning, with reaction time measured by computer.

-Bikes and bones. Kids sit on a stationary bicycle and an identical bike and bones imitate their movements. Kids observe skeletal motions.

-Breath control. Needed to perform various sports kids blow onto an airfoil and loft time is calculated.

-Temperature. Kids use a liquid crystal to analyze their body temperatures before and after exercise.

-Heart rate. Heart monitor encourages before and after exercise analysis.

-KIDSPORTS Cafe. Dietary effects on how athletes perform. Kids choose food models and then receive information about nutrition.
Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. The exhibit as a whole, and in part predicates its attention getting power on novel events. It organizes content and presents organizers, uses prompts and cues, presents examples, and bases itself on prerequisite information.

B. Motivation and attitudes. The exhibit is also specifically designed to motivate students to learn, and to develop self-confidence in their ability to go beyond the exhibit, transferring the attitude to "real" life. Learners engage in win/win experiences, and they model.

C. Cognitive skills. Kidsports is about sports-health, and there are clear and unambiguous examples of the topics; there is the opportunity to actually practice and experience feedback, there are relationships among concepts, and students are able to demonstrate the principles.

D. The learner. The exhibit specifically considers the information processing style of the visitor, it is inductive, it has a degree of redundancy, it provides hands-on experience, is self-paced, has auditory, visual, and printed material, and provides for peer learning and teaching both as an interaction with others--and from the exhibit.
E. As an exhibit, it develops multisensory associations, it allows the exploring of symbols and connotations, and probably allows for becoming aware of connotations. It allows for speculating and synthesizing, and for judging.

F. The exhibit encourages an inductive approach, encourages the interpretation and summarization of recurrent ideas, themes, and qualities. It also employs the use of analogies and metaphors (which would be similar to what the visitor might do in this or other venues), and encourages persistent contact with the exhibit, leading to transfer.

Since the stated purpose of the KIDSPORETS exhibit is to make "real-world" connections, and use "real situations" with real people to demonstrate this information, they are using the modeling or learning of behaviors by observation techniques in this exhibit.

Observational learning is associated with the research by Albert Bandura (1977), and is typified by a person's action of increasing or decreasing their own behavior, based on whether the behavior they observe is rewarded or punished. In the case of KIDSPORETS, COSI purposely plans the exhibits so that there is no "right or wrong" response and puts, as they say, skill levels where all kids "will feel comfortable about participating."

Thus the observed behavior is virtually always "rewarded" in a win/win scenario, assuring positive reinforcement. Since the example of the behavior is "concrete" i.e. resembling the actual
circumstance in "real" life, it can be more readily repeated than it perhaps could if the action was abstract--such as watching someone shoot a basketball on a TV monitor.

Following Bandura's four elements of observational learning (attention, retention, production, and motivation) the features described in virtually all of the exhibits are designed to provide for this sequence of assimilation, particularly true with the topic of sports.

The children are also led through a "discovery learning" process as they attempt to try new tasks which are deliberately sequenced, and this following the inductive learning theory of Bruner.

In some respects, because one of the stated purposes is also to "encourage peer interaction," the exhibit touches on Erik Erickson's (1963) theory concerning emotional and social development. Because the exhibit description materials also mention the move out of the egocentric stage, they would be introduced to the notion of "identity," and the development of "self-confidence" as noted in the COSI objectives, and as rightly addresses the needs of these age groups of learners.

**Synthesis of Science Museum Programming**

Two significant factors emerged for me during my review of the selected cross-section of science museum education reports. The first is the almost unanimous advocacy for the use of formative
evaluation techniques (or "prototyping") as a means of arriving at an acceptable museum exhibit (regardless of objective). In one example, this technique was being used to evaluate an exhibit's effectiveness in getting its messages across, to provide information that could be used to alter or modify an exhibit, or how to provide for future exhibit planning. Several of the studies focused on visitor behavior as observed and recorded by museum staff, and one researcher followed fairly strict guidelines in the attempt to validate her study by controlling and/or accounting for variables.

The second is the science museum's emphasis on "rigidly controlling" educational outcomes that are "carefully calculated" to prove established facts and principles in science. Another museum educator (Diamond) from my reports was concerned with exhibit design, and expressed a "commitment" to creating a range of opportunities for "learning," within the parameters of the visitor's perceptions and experience in both science (the particular subject matter in this example) and aesthetics, which she felt was pertinent to science museums. She called for the museum to not only present information, but to provide for "understandable experiences."

My findings as a result of applying criteria that was based on the principles of instructional design, and methods for engaging in critical analysis relative to the museum follows. I note for the reader of my paper that although the criteria I selected are "borrowed" from other domains, the application was rational, and coincided so well in terms of the environment, that I would not
hesitate to suggest that this could indeed be the theoretical "model" that the museum profession seeks. I conclude that:

A. 1. Eight cases out of nine either acknowledge or provide evidence for the need to introduce a novel experience in an exhibit to get the visitor's attention.

2. I did not find any evidence to suggest that an exhibit informed learners of expected outcomes.

3. Only two out of nine reports specifically called for the recall of prerequisite information in order to "read" the information they presented, but most were rather simplistic or intuitive as to content.

4. Presenting relevant information is hard to quantify from a written report when not specifically noted. I assume that the formative evaluation techniques applied by most science museum educators had the effect of weeding out extraneous material.

5. I interpret the design of an exhibit, in a museum to be an organizer, but others might not. All nine reports demonstrate or call for the use of organizers or the organization of content, but only two went into an detail about how to accomplish this--suggesting that how to address "content" issues leading to learning would be a worthwhile educational objective for museum educators.

6. Most science exhibits from my sample have determined that the presentation of simple information is best for
the museum visitor. Stated in reverse, however, they seem to be very successful in addressing the problem of breaking down complex information into simple ideas.

7. The reports that I selected to include in this study that actually described an exhibit all suggested that prompts and cues were effective in getting attention, or directing the attention of visitors, or for calling on known information.

8. Only the KIDSPORTS report varied the information presented, i.e. by offering multiple examples of the same concept, in the same exhibit.

9. All of the nine reports used examples, and this is precisely the unique contribution that the museum makes to learning.

10. Only the KIDSPORT exhibit plan allowed for practice, in any sense where there would be feedback.

11. Only one exhibit provided for feedback for the visitor.

12. As a practical matter, on the KIDSPORT exhibit provided any meaningful opportunity to review and repeat, i.e. one could repeat the other exhibits but wouldn't have any idea of improvement, etc.

B. 1. Although exhibits are not "instruction" per se, I believe that science museum exhibits that cover topical and relevant phenomena teach us about things that we want to know in ways that would not occur in the classroom. Many of the active exhibits reported uniquely let the visitor know that the information is important.
2. Two out of the nine reports sampled definitely stated reasons why the subject was important.

3. In an abstract sense, the excitement of going to the museum to "learn" is an external report--vs. the intrinsic reward for engaging in an educational program.

4. One exhibit out the sample was specifically designed to provide for success and accomplishment.

5. The KIDSPORT exhibit combined attractiveness with subject matter content. Others suggested that this might be the case.

6. I could not infer from my sample that this strategy was employed.

7. All nine reports were aware of the goal of modeling interest and positive attitudes toward the subject matter, with three offering specific examples as to how this was accomplished.

C. Concept learning.

1. Two reports indicated that they presented definitions as a part of their concept presentations.

2. The traditional science museum is thought of as presenting numerous examples of objects that belong in a class, but do not always take the steps necessary to differentiate the class--which would be the point of designing instruction. Only two reports in my sample indicated this was an objective.

3. There was insufficient data to conclude that this strategy
was employed, save for one of my sample reports which outlined learning theory for the museum.

4. There was no data to conclude that this strategy was being employed in a museum from my sample.

5. One example, having to do with rocks and minerals, could be included in this category.

Principle learning.

1. The only evidence of this in my sample would have been found in one exhibit where they provided prerequisite concepts.

2. Three reports acknowledged that they were aware of indicating the relationships between concepts.

3. Two reports noted the need to have students demonstrate the principles being presented (to demonstrate learning).

4. Two reports noted the need to have students practice and get feedback on demonstrating the principle, but note that all exhibits that recognized the need to employ formative formative evaluation (as an example) were practicing and getting feedback, i.e. the visitor to the museum may not, but the exhibit design is.

Problem solving.

1. As noted, only one report was concerned with prerequisites but all of the reports pointed to the need for exhibit designers and museums educators to have these skills.

2. All reports presented problems that they were trying to
resolve as a part of their investigations in museum education.

3. All of the reports were attempting, in my view, to delineate a direction and provide guidance in order to describe the problems they were trying to solve.

4. In their formative evaluation trials, the museum educators were trying to problem solve, practice and get feedback on their probable solutions. The museum visitors do not fare as well, but it may not be desirable to do this with a visitor during a short exhibit encounter.

D. 1. Information processing style. All science museum and related reports indicted an inductive presentation. Only one report appealed to the need for redundancy, all appealed to the hands-on style, and seven out of the nine factored the self-pacing. One report noted an attempt to pace, but in trial found that visitors self-selected.

2. Use of senses for perception or reception of stimuli. All reports were geared toward a visual environment where visual stimuli would predominate. The reports that actually described an exhibit in place noted the positive effect of multiple stimuli, such as auditory and from printed materials.

3. Social needs. One report was specifically geared toward the positive effect that peer interaction had on learning (family) both with and from. Another major exhibit report
designed the motivational aspects to appeal to peer interactions and relationships.

4. Concerning physical and emotional needs, all of the reports expressed an awareness of the need to move around, or to be isolated depending on the subject matter.

E. I want to once again make clear that I included criteria for critical analysis of art objects because in many ways a museum exhibit communicates the message constructed by the exhibit designer in the way that an artist does with a painting or other art object. It also addresses the need to interpret information gathered with the eyes in meaningful ways.

1. Perceiving obvious and subtle qualities. Four out of the nine reports were identified as being aware of the need to develop multisensory associations, and exhibits such as the rain forest and the diorama were explicitly presenting contexts, with the others being aware as a part of their plans for learning.

2. Interpreting perceived qualities as sources of feeling and meaning. Speculating as a strategy for processing information was specifically emphasized in two reports, and all provided the opportunity to synthesize the information being presented—at the discretion of the learner. I didn't note any evidence for saying that they built a vocabulary to describe perceptions as a part of their interactions because they would have been dealing
profoundly promotes aesthetic distance (affecting the disinterest), but interference from objects and people in the open space can make it impossible to achieve the viewing distance that some paintings require.

Berleant states that if we were to recognize perceptual differences among paintings, for example, and acknowledge that appropriate physical distance is a precondition for perceptual experience to occur, we would begin to arrange art objects to permit and encourage the viewer to participate in this manner. As an example of what he means, he says that landscapes and seascapes lend themselves to different kinds of experiences "centering on perceptual qualities of light, mass, space, or water."

One could then bring together paintings that convey differences in the visual sense of light (shadowy, brilliant, lucid, sensuous, suffused). The openness of van Gogh landscapes could be contrasted with the filled one of Rousseau, Gaugin, or early Kandinsky, he goes on to say. Berleant also suggests that there are endless opportunities for "imaginative juxtapositions," such as Duchamp's descending nudes against the domestic interiors of Vermeer, or the "varied consciousness toward women" found in Leonardo, Rubens, Picasso and Rembrandt, deKooning, Modigliani or a Schiele.

Berleant stresses that his central theme becomes one of designing museum experiences that offer a perceptual parallel or contrast [concept-of the class or not of the class], and not, for example, a theme about the "rendering of towns...but the sense of
experiencing towns." By "presenting art objects in ways that encourage their own unique perceptual qualities," and by "arranging art into sequences of experience," Berleant says that museums can transform themselves into opportunities for enlarging consciousness and enhancing our understanding, vis a vis "participatory aesthetics."

Critical Analysis.

Berleant is describing the distanced, visual mode of aesthetic perception as being predominant in the art museum setting. We study art works as discrete objects, where each is mostly presented to the perceiver as visually and intellectually isolated, thus robbing the visitor of the opportunity to participate in the "active perceptual engagement with the art work" that he seeks. He calls for an "intimate" experiential continuity between viewer and work.

To do this he suggests that museums arrange "experiences" rather than objects, and thus base the aesthetical response on "perceptual experience." Although Berleant doesn't cite relevant theory, his perspective suggests several factors at work, in my opinion.

Generally, I believe that he is really calling for what Robert Gagne (1977) refers to in his types of learning outcomes. We know that most art museum responses are of the untrained affective type in nature. Gagne describes these as the "affective component" of "attitudes," and as he says (p. 220) "planned outcomes of attitude
learning, whatever their specific nature, are definite components of educational programs," for children and adults. "The affective aspect is that "feeling tone" of these "learned internal states."

Gagne describes the "attitude" as being one that varies from "positive to negative" which represent two dimensions. One is the "behavioral tendency" of seeking versus avoiding, and the second dimension he says concerns the "liking" and "disliking." Thus, he goes on to say, when the attitude is positive in both the seeking and the affective dimension, a person may be "willing to pay money to attain the contact."

The suggestion that exhibits be arranged according to "experiences" in order to afford the active perceptual engagement as opposed to the distanced aesthetic approach, seems to address those aspects of cognitive style that refer to field dependence and independence as a way to explain educational significance and purpose. People who are field dependent perceive a pattern as a whole, while those who are independent perceive separate parts of a total pattern. Field dependent people tend to be more oriented toward people and social relationships and independents are more likely to be task oriented.

Perleant proposes that art objects be organized with similar features, such as those representing a concept for a "visual sense of light" and because he indicates that they have differences in the way they depict these features, he is, in my view, interpreting "concept" in its fullest meaning by showing cases and non-cases.
Thus, when he says that organizing art works for "active perceptual engagement" with the desired effect of eliciting "experiential continuity between visitor and work," it is the case that he is making use of a way in which people are known to "perceive."

In art we address field independence and dependence in terms of foreground/background (figure/ground) relationships as to what patterns are perceived as emerging in what I have previously described (Gallant, 1989) in some detail as the innate perceptual attribute or asset that a museum learner (or visitor) has and that can be utilized by the museum educator or artist when constructing visual information for the purpose of communicating.

Case #7


Although Museums once featured "heterogeneous" collections, "specialization" has occurred over the past century to the point where specimens illustrating one subject being combined to form separate collections. In some cases, she says, historical societies passed on works of art to specialized institutions as "these came into being," with the advent of specialization and the "great storehouse" concept that museums once had were gradually modified.

This has led to a "schism" in scholar's minds about specialties, and a "mutual ignorance" concerning the propensity for some to treat an object as "absolutely aesthetic" or as "absolutely
historical." The "specialization" is not the problem, however, according to Tellier, but the "failure...to maximize the utility of exhibit objects to patrons."

In the history museum an artifact may be displayed with detailed information about the use and meaning of the object in the lives of the people who made it, says Tellier. In the art museum the same object may be displayed in "aesthetic isolation" without regard to its cultural context. The difference in the interpretation of such an object is reflected by this frame of reference, which is identified as being either "aesthetic" or "intellectual."

Tellier claims that both frames ignore the power of an art object to "communicate knowledge, ideas, and emotions." Each frame of reference determines the way objects are presented and, as the viewer's perceptions of a work of art are affected by the way in which it is seen, and by the label it carries, each offers different opportunities for art appreciation.

The aesthetic frame of reference.

- Art products are often studied apart from their cultural contexts.
- The effect of the artist's cultural environment, such as political, religious, and economic systems is usually ignored.
- Although some objects have had "specific functions in their cultural contexts," viewer's experiences have been "emotional" rather than "instructive."
CHAPTER IV
ART MUSEUM EDUCATION RESEARCH & THEORY

Reflecting the museum education practice view, the May/June 1991 issue of *Museums News* (the publication of the American Association of Museums) contains two articles that fairly bracket the kind of learning experiences that one is likely to find in any contemporary museum today. One concerns the use of interactive multimedia and the other is about the writing of effective labels.

According to author Ann Mintz ("Moving Target," pp. 65-68), interactive multi-media programs offer four elements that effect the potential learner. They are context, content, user interface, and pattern of interaction. Nancy Tieken's article, "Take a Long Look," (pp. 71-72), is based on her empirical study of visitors with the resultant data showing that they want to know more about an object in the museum than just the date it was done and the artist's name.

Another perspective on visual learning that is pertinent to the art museum setting comes from Rudolf Arnheim's text on "Visual Thinking" (1966, p. 315). Constantly on an educator's mind should be the "systematic training of visual sensitivity" as an "indispensable" part of any educator's preparation for his profession. The difference, he goes on to say, between a picture
that makes its point and one that does not can be discerned by anybody whose "natural responses to perceptual form have been cultivated rather than stifled."

The experimental and theoretical basis for visual education is being developed in psychology, but "practical experience is best provided by work in the arts" (Arnheim, 1966). Gaining insight into art works, either by means of criticism (inductive analysis), the study of art history, aesthetics, or by engaging in studio can best be facilitated in the museum setting where the actual objects reside. Gaining access to this information is one of the primary objectives of this study, and it is hoped that by synthesizing a combination of theory and practice a model for museum education might develop.

One way to increase the "visual sensitivity" that Arnheim prescribes may be the method for approaching "critical" analysis articulated by Edmund Feldman in his book, "Varieties of Visual Experience," (1987). Feldman makes a case for an analysis of art conducted in an "orderly and sequential process" fashion, as a systematic way to make the best possible use of our "knowledge, intelligence, and powers of observation."

Art-Critical performance, according to Feldman, can be divided into four stages: description, formal analysis, interpretation, and evaluation. In a similar manner, well known art education scholar Laura Chapman in her book "Approaches to Art in Education," (1978) writes about the effectiveness of the inductive approach to
"perceiving and responding to visual forms." According to Chapman, "developing perceptual abilities is worthy of the same attention and educational time that in the past has been reserved for creating art. This study will hopefully shed some light on an unfolding of a potential and probable art museum education model.

The Art Museum

Art museums are those we typically think of as providing an emotionally-driven experience, where we may go to enjoy being confronted with aesthetically appreciated objects in a variety of media--such as paint, ceramics, wood, metal, cloth, film and others. The art museum is a place that contains objects or artifacts, and each (for my purpose) can be thought of as containing "information" that may not be immediately available to the visitor, in terms of being able to fully understand what they see.

That is, objects such as paintings must be attended to visually, with little interpretive data other than what is seen with the eyes. Art museums typically do not design the "exhibit" so that objects can be manipulated or touched, are not interactive, and unlike the science museum, do not always represent some well known phenomenon. Even when one sees an example of an "Impressionist" art work on a wall, for instance, the information that would lead to any conclusion regarding that fact is unavailable in that single
representative. Some art museums may offer the visitor a docent or teacher-based tour of the objects, and these people (or electronic devices such as tape recorders) do serve to present some context, such as background information about the subject matter of the work, about the artist, or the period.

The cases presented in this study represent a variety of approaches to getting some meaning from an art object in the museum environment. In all there are nine such examples critically presented, each followed by an analysis based on the criteria that I introduced in Chapter II for instructional design and learning. I have also included some reference to the educational concepts suggested or stated directly from the material.

If the reader has already examined the case studies presented in Chapter III on science museums, he will be immediately struck by the fact that the art museum educator concentrates almost solely on the one-to-one relationship between the person and the object. In my opinion, it is also obvious by omission that the art museum educator or report writer does not articulate that any attention is paid to a learning outcome (cognitive or affective), although one assumes that this is implied as a part of coming to know an art work through critical analysis. There is also very little attention paid to the effect that the "exhibit" plays in getting the attention of the learner, nor does anyone really address design criteria for providing feedback and practice with the new information once it is accessed.
Case #1


"Art takes time to create as well as to understand." By stopping to look carefully you will be able to "listen" to what the work has to say, according to the opening sentence of this guide. The following are the Museum's "ideas for thinking about art in a meaningful way:

1. **Subject Matter.** Every work of art has a subject, an apple or a tree, a shape, color or line.
   -Describe what you see in this work of art. Look carefully from top to bottom, side to side. If it is a sculpture, walk around it.
   -View it from a distance of two feet and a distance of ten feet. Do you see any difference?

2. **Visual Elements and Composition.** Visual elements include line, color, shape, space and texture. Composition is the arrangement of these elements in a work of art.
   -**Color.** What colors are seen in the work? Is one color used more often than others? Are the colors realistic? Did the artist use warm or cool colors (warm=yellows, oranges, reds; cool=greens, blues, violets)? Is color used to form a pattern? Are the colors primarily light or dark
(by squinting your eyes, you can readily identity the light and dark areas?

-Line. Where do you see lines in the work? Describe them (curved, straight, thick, thin). Some lines are draw by the artist, some are formed by the colors and shapes. Are there diagonal lines that tend to show movement? Are there horizontal or vertical lines that seem to be more steady? Are lines used to create a pattern?

-Shape. What shapes do you see in this work? Are the shapes repeated to form a pattern? Are there shapes formed in the empty spaces? Are the shapes geometric (regular like circles and triangles) or organic (irregular like those found in nature)?

-Space. Paintings; Artists use visual devices of perspective to make a flat surface (two-dimensional) appear to have depth or space. Such as, size (objects near appear to be larger than those in the distance), overlapping (objects that are closer hide ones that are further away), atmospheric perspective (objects in the distance are fuzzy and have less color), linear perspective (diagonal lines or diagonal rows of objects that lead you to the imaginary vanishing point in the painting--such as railroad tracks vanishing in the distance. Do some objects seem to be further away than others? How did the artist do this?

Sculpture; Space is an important part of sculpture. The
sculpture itself takes up space. Is the sculpture compact and solid or does it contain elements which protrude? Does the empty space (negative space) create shapes? Does it emphasize the subject of the object?

-Texture. This is the way the surface of something would feel if you could touch it. Some textures are suggested (skin, satin, wood, lace). Others are really there, such as lumpy paint, smooth marble. Describe the different textures that are suggested in this work and the ones that are really there.

-Composition. Is there a certain point that attracts your eye when you first look at this work? What is that point and how has the artist used line, color, shape, texture and/or space to lead you eye to this point? Does the composition cause your eye to travel in a certain way as you look at the work?

3. Interpretation. The Columbus Museum of Art breaks this feature into two parts, "Expressive Content," and "Cultural Context." Expressive content is he "mood" the artist has created by the use of visual elements and their arrangement. In the museum, questions might be; What is the mood of this work? (light-hearted, peaceful, agitated, scary, exuberant, thoughtful, tense, disappointed). How do the visual elements and composition contribute to he mood? Cultural context. Before one can understand a work of art
more fully, it helps to find out more about the artist, and
the time and place in which he or she worked. The label
next to the object, books, encyclopedias, and other
reference materials can be consulted. Questions to ask;
Who made this object? Where was it made? When was it
made? How was it made and with what materials? Does the
object reflect the time and place in which it was created?
Why or why not?

4. **Critical response.** This is a personal assessment based on
the study of the subject matter, visual elements and
composition, the expressive content, and cultural context.
After studying all of these elements, ask; Is this a
successful work of art and why?

**Critical Analysis.**

This report concerns the inductive process of breaking down the
elements that can be visually observed in an art object in the
museum. While it implies cognitive activity, a learning objective
is not stated as a goal, i.e. how will understanding the elements
that go into making an object be put to use. Nor are there any
connections made to other objects or members of the class. If this
report were a lesson plan it would need a beginning and an end.

Applying the criteria for evaluation that I outlined in Chapter
II (A-F), I find the following to be true of this example:

A. Interpreting this report as a piece of instruction,
"Thinking about art" would be the expected outcome, and the organizers for the content are the category tags. The example is the art object. The practice would be in going through the exercise but there is not feedback—and this will be true when using this method by oneself.

B. Motivation and Attitudes. Engaging in the exercise, and coming to some understanding of how to intellectually access an art object should motivate a person so disposed to continue to study the subject. This report does not emphasize the importance of studying art, nor allude to any external reward.

C. Cognitive skills. Examples of objects belonging to a class are not always presented in the art museum. This report does not specify the need to go beyond the object being studied to see how the class of objects compares. It also does not present non-class examples, and thus does not provide practice. There are no prerequisite skills called for nor developed, although one would assume that "looking" skills are being developed. Problem solving is limited to engaging in the critical exercise.

D. The only implied consideration for the learning style is the inductive process itself, using visual stimuli. If you do not process this way you would not be interested.

E. Approaches to responding to art. Does engage in perceiving
obvious and subtle qualities and encourages speculation, synthesizing, and empathy.

F. Emphasizes the inductive approach by analyzing individual elements of the object to come to some understanding. Also empathic because it encourages noticing the visual qualities.

The perspective of the CMAs approach involves, in my opinion, defining the attributes of a concept, where "concept" broadly stands for an art object. Although one may conduct an analysis based on these guidelines and still not find the art object intellectually accessible, it is possible to come to a level of understanding, of if not all aspects.

In my view, this sort of inductive analysis is similar to what we think of as the "problem solving" process, where as Gagne (1985, p. 178) points out, "problem solving is not simply a matter of applying previously learned rules," but is also a "process that yields new learning."

The idea of using an inductive process to come to some understanding of an art object (what it is, or what it means?) is also indicative of Bruner's strategy for learning, where this process becomes the "problem" (or perhaps the artist presents the problem?) to be solved or investigated, where we are to inductively formulate general principles from details and examples. This is the "discovery learning" principle.
Over time, or with continued practice this would lead the learner to an understanding of the art object's system of "codes," where codes stand for a "hierarchy of ideas or concepts." Soon, the learner would be able to access the "code" of more art objects, expanding his or her own ability to assimilate this type of data into schemes, and begin to approach visual information with some degree of confidence, just as one does by expanding vocabulary.

Case #2

M. Coley, "Focus on Art," Working Parents, October/November 1985. The article is based on research from the Department of Education at the Museum of Modern Art, NYC.

Coley says that museums are showplaces of our culture that exist for both visual pleasure and enlightenment, and also offer a place where parents and children can engage in joint "exploration." The article, she says, focuses on "the general principles of how to look at art with children," how to get your child to look, what kinds of things to point out, how to form appropriate questions and answers, and "how you both have fun."

Coley first suggests that the parent plan an itinerary, and that one spend a different amount of time on each of the works chosen, according to the child's response. It is important that you and he child "discover together" when a answer to a question about an art object is unknown. Don't be afraid to shorten the visit if times starts to drag, or attention wanders.
Parents should review the basic elements that are common components of a work of art. Looking, naming and asking questions will be useful to both child and parent. A basic vocabulary consists of:

- **Color.** What color is most apparent? Name all the colors you see. Are they clear? Fuzzy? Name the things that the colors define.

- **Line.** Point to all the lines you see. How many are there? Are they used as outline, shading, or do they make a pattern? Notice the boundary where two colors meet. It is a line?

- **Shape.** Are there geometric shapes (squares, circles or triangles)? Are there "biomorphic" shapes (curvy, resembling nature or something organic) which look like it's in the process of growing? Name all the different kinds of shapes you see.

- **Composition.** What do you see first? Composition is the overall design and arrangement of colors, lines and shapes. It is the structure of the work that leads your eye through the painting, or he path your eye takes.

- **Idea or content.** Do you get any kind of feeling, mood or message? What kind of world is it and is it real or imaginary? Day or night? Inside or outside? It is something recognizable? What is this picture about?

Coley says that artists make conscious and unconscious decisions as they work, and "by recognizing how artists use color,
line, shape and composition, you gain access to the artist's intent" and the purpose of the work. Although "beauty" has been a motivating force behind the creation of a work of art, other factors can be:

- A personal feeling.
- A social or political situation.
- The purely decorative.
- An exploration of new materials.
- Ideas about art itself--formal questions of organization, simplification or a contemporary vision.

When visiting the museum with a child, it is helpful to consider his developmental level. Coley cites the work of Jean Piaget and the stage theory of intellectual development which, she says, correspond to their ability to view a work of art. The more children see, the sharper their discriminatory powers become.

In the first stage, from two to seven, a fantasy image or scene can be thought of as real. Role playing is a dominant and satisfying feature, and works with recognizable imagery, shapes and colors are most appealing to this child, as are works with "a narrative content or story." Simple, clear and colorful works with centrally located or striking images are most accessible, such as Picasso's "Three Musicians."

At stage two, ages seven to eleven, the child mistrusts what cannot be seen or proven, and must discover everything for himself. Organizing and ordering the concrete. Art works that depict
familiar objects (boats, houses, people, flowers) are best to view with this child, such as Van Gogh's "Starry Night."

According to Coley, at stage three, ages eleven to fifteen, abstract thinking is possible. Responses and discriminating taste emerge which "ascribe character or expression to a work." The young teen can distinguish styles, can understand composition, and take a "vital interest in the content of the work," which is beginning to be interpreted through their own value system.

The museum outing that helps to tune a child's "power of observation and reasoning" and helps him develop powers of visual perception and judgement can help him to understand how art can be the evidence of how people think and feel in the world.

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Taking the initiative to look at art with children, and to engage in the activity of pre-organizing criteria would inform learners of expected outcomes and would serve as the novel event at the begging of the instruction. This report also suggests that progress will be from simple to complex, it provides examples (which is a key factor with art objects in museums), and provides for practice. Looking at art with a parent would have the effect of providing feedback.
E. Motivation and attitude development. When parents direct the learning of the child it becomes important, albeit the young ones will not define "important." It would also be the case that parents who are aware of the educational potential of the age group, and can tailor the learning event will be able to ensure that learners experience success and accomplishment. The aware parent would also be modeling behavior.

C. Concerning cognitive skills of thinking and processing information. This report encourages looking, naming and asking questions, presents vocabulary which is then identified or put to use when looking, with feedback. A "concept" of what defines art is being built. The problem solving aspect is demonstrated by engaging in the critical analysis process, and this report also goes the extra step of suggesting multiple solutions.

D. Clearly this report is fully aware of the information processing styles of the visitor, and the various need to present concrete examples, to go inductively into the process of looking or thinking, and considers the social aspects of looking with a parent or someone who can direct the learning.

E. For responding to art, the report advocates perceiving obvious and subtle qualities such as discriminating basic properties, explores symbols and connotations and
becomes aware of contexts. It also explores qualities as sources of feelings and meaning, builds a vocabulary, and encourages synthesizing and speculating. Clearly leads to a process for making a judgment and a personal preference. F. Advocates the use of the inductive, empathic and interactive approach to criticism.

Coley addresses the "developmental" issues that should be considered by the parent who takes their child to the museum. I believe, without going any further, that this aspect alone is invaluable for the person who reads this article because visual perception is an integral part not only of everyone's world, but particularly of the child's. Gardner (Smith, Gardner-1975) wrote concerning the artistic symbolization found in early childhood that it is suggested that "distinctive patterns of expression and communication reveal developmental principles and suggest educational procedures."

The article tracks the "artwork" of two children aged 3½ years and addresses their individual differences and similarities in terms of stage, as affects their ability and inclination to articulate symbols. Gardner notes that at age 2½ the children couldn't construct recognizable forms and now "...the swiftness and inexorableness with which children acquire the ability to use various artistic media is a formidable accomplishment..." second only, he says, to their ability to rapidly develop the skill to depict "...events and experiences in the world" (p. 14).
Gardner goes on to state that the "apprehension and appreciation of symbols is necessary for every aspect of life:

Whether one is reading a map, computing change after a purchase, engaging in an argument, or simply contemplating a picture, one must recognize that a certain element, or set of elements, 'stands for' some object or experience in the world.

Typing, he goes on to say, the production of active symbol production, or drawing, to stages, one finds that the organism follows the "developmental" chronology (if not a precise age-related threshold). For example, at age two, according to Gardner, there is relatively no symbol use (although other studies show that the infant "symbolizes" activities, such as feeding; Gallant, 1989). From age two to five (which corresponds to the Piagetian pre-operational stage of language development and thinking in symbolic form), Gardner says that the child acquires an "incipient mastery of the symbol systems of his culture."

In fact, says Gardner, whether the child of from five to seven years is seen as highly advanced or relatively immature has specifically to do with an assessment of his symbolic competence, and on a "correlative judgment about the extent to which symbolization exemplifies the highest point of human intellectual activity." Gardner goes on to point out that "the cognitive approach" as exemplified by Piaget and Bruner--Gallant, "construes symbolic activity as preeminently an intellectual achievement" (1975).
Cognitivists concern themselves with symbol use and art chiefly as evidence for mental growth, according to Garner, and "assesses the intellectual development of children by evaluating their mastery of spatial relationships," or their "capacity" to encode meaning. Since symbolizing is a "routine" facet of development, and excluding at this point any consideration of innovative symbol creation, the method that Coley suggests for understanding the child's developmental stage when confronted with "art" objects is, as I have tried to demonstrate, a significant bit of information for the parent.

Combining the inductive approach with the recognition that not only does the child "think" (as I would term it with elaboration on the point) and act by producing symbols, but exercising his or her ability to deal with symbols (as concepts or as abstractions) could be an important aspect of the child maturation.

Case #3


Museums educators need to "acquire technical skills to gather data that reflect a range of reactions to given exhibitions," in order for it to be meaningful, according to Praverman. Evidence of this sense of responsibility, he says, has not been found in the research literature dealing with art museums, or in the attitudes of museum educators themselves.
According to the author, no traditional validity tests in the literature are devoted to art museum visitors. To empower visitors, he says, art museum professionals should develop theories on learning by a wide range of adults. To do this all "information" available in an exhibition space must be examined, not just what the art historians define as content. At the "basis of these theories must be valid data reflecting the motivations and attitudes of the visitors themselves."

The focus group interview method is widely used in various social science disciplines, serving as a springboard for both qualitative and quantitative studies. Braverman indicates that this method has been used successfully for museums and market research firms. A "focus group" consists of 6-12 willing, recruited participants, a trained moderator, and generally the participants do not know each other or do not have a working relationship.

To make the visitor a significant part of the art museum world, professionals must create situations in which visitors may express themselves in a ways that reflect their own attitudes. By using focus groups, participants are encouraged to express their own perceptions concerning the subjects being studied. Since art museums are unique civic institutions that present researchers with difficulties that may affect the validity of their studies, Braverman calls for the development of "methodological material" to address this environment, with focus group interviews as the primary basis for theory building.
Several factors should be considered: (1) participatory interviews are social situations that must be structured so that the vested professional goals and values do not distort the data being sought; (2) consideration must be given to psychological factors that set social research in art museums apart from that in other cultural institutions; (3) visitor's perceptions of art museums differ significantly from their perceptions of other museums and their responses may reflect this perceived social distance between art and history or science-oriented types. Braverman claims that these distinctions are generally ignored by museum researchers.

How should art museum researchers conceptualize exhibition outcomes for the leisure adult during focus group interviews? Most exhibition behavior should be viewed within the concept of self-directed activity, says Braverman, where the demands of a professional or curriculum-need to task-oriented participation by assigned students, art historians, or critics is of a singular nature. These visitors are thus self-selected and self-directed individuals, who come to the art museum on their own, and thus it is difficult to predict their level of learning and sophistication.

Researchers and art museum professionals "ignore both the range and complexity of learning that takes place in an exhibition." Models "purporting" to structure the adult experience in the educational environment of the art museum have been published, but the "desired outcomes of the exhibition experience...expressed by visitors themselves," have not been documented.
From this perspective the exhibition experience is viewed as an entry-level activity that will lead to progressively more structured and goal-oriented activity, such as the "docent tour, lecture, or seminar." This approach reflects the training, goals, and values of the museum professional, according to Braverman. It is oriented toward the "exhibition's content as defined by art historians, while ignoring the characteristics of most adult visitors.

Attempts to classify visitor motivations have led to three general categories: (1) scholarly, (2) visitors with specific interests, (3) visitors in search of recreation. Although these categories are not exhaustive they represent the continuum on which adult visitors may be represented. Using such a scheme, however, does not address visitors (excluding scholars) who may also have "cognitive goals, experiences, or attitudes that are meaningful for museum professionals." This view also provides no conceptual basis from which theories can be developed, according to Braverman.

Visitors' nonacademic motivations are multidimensional and such projects as art exhibition visits should be considered as primarily "inner-directed" activities. Most informal adult learning begins with issues perceived to be meaningful to one's life, and almost every adult has more than one reason for engaging in informal learning activities. Thus there is no single reason for activities involving most adult learning.

After eliminating art-history defined, content-driven, learning as the primary goal for adults, how should art museum researchers
approach the exhibition experience. Braverman contends that it should be seen in terms of "hedonic" [pleasure] responses—those facets of visitor behavior that relate to the multisensory and emotive aspects of one’s experiences. In the art exhibition situation, visitor responses will be the result of more than one symbol system; seen in art objects, in the various forms of written information, and in the audio/video presentations.

With no assigned task to perform upon leaving the galleries, most visitors participate in the exhibition in a manner reflecting their own notions of appreciation—some personal some articulated. Most view exhibits of art in social situations; on weekends or admission-free days when the galleries are crowded, or on other days when few attend. According to Braverman, the various social situations are a significant component of the "hedonic perspective."

One such situation involves cultural consumption within what would be considered a "Civic activity," and another involves "emotional arousal." Emotions represent motivational phenomena with "characteristic expressive and experiential" components. The way visitors express these components should be an integral part of the focus group interview. This arousal of emotions will influence the visitor's decisions concerning future museum activities.

Although studies have been done on visitor's responses to labels and panels, Braverman contends that these are "narrowly defined" as responses to preferences for objects or instructional delivery systems, which again reflect the activities and values of
museum staff. Research into hedonic or emotional arousal has been investigated in other forms of civic consumption, such as in dance, drama and music.

Thus the art museum exhibit becomes a source of "subjective" research, rather than curator "objective" based [as in the science museum]. During the focus group interviews, the researcher should be concerned with what the exhibit represents to the visitor, not "merely as a vehicle for art historical content." Surveys should also include the visitor's own descriptive language, as a truer source of "visitor-driven" data.

As visitor perceptions of exhibition attributes are identified by the museums staff, they may be related to the characteristics of culture consumers in a given community, according to Braverman. This type of data may serve to further such educational goals as making a positive contribution to attendance and program participation--as has happened with audience development in the performing arts.

Art museum professionals must test theories based on valid data by using reliable items that address a wide range of visitor responses over different exhibitions. The focus group interview technique provides a means by which art museum visitors can express their own attitudes, values and goals. The ability to gather and use such data is the challenge for the profession.
Critical Analysis.

This case study report does not portray how an exhibit was designed but how to measure attitudes as an approach to learning, both for the museum curator and the visitor.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. It would probably be the case that forming 6-12 art museum visitors into a group so that they could express their perceptions would be a novel or unexpected event. Most visitors already have a task in mind and so the "instructional" focus should be on becoming aware of and measuring attitudes—as the subject of research.

B. This research report is not so much involved with creating positive attitudes toward learning for the visitor, as in creating the opportunity for art museum educators to measure attitudes as a part of the affective domain—where attitude is not a cognitive component but an affective one in my interpretation. The external reward for the museum researcher is the ability to measure something other than art historical content objectives, leading to formative evaluation-type opportunities for the use of information effecting qualitative outcomes.

C. Cognitive skills and concept learning. In this particular case the report is developing the concept of "focus group," for the museum educator because the article is providing
examples and non-examples of how to develop people's attitudes. Concerning the result of the research, the use of focus groups to pursue attitudes serves the criteria because it would engage the group in the problem solving and a good deal of practice and feedback as a result of the interaction. The author's proposal presents the problem, provides direction and guidance and indicates the relationships among concepts.

D. This report specifically considers the learning style of the visitor because it wants to use the focus group concept to record and quantify perceptions and attitudes, and notes the various categories of information processing such as multisensory, symbol system understanding, and the written, visual and audio inputs that can be researched. Calls for research on emotions and feelings in the art museum.

E. With regard to critical responses to art, the report specifically calling for group members to express their perceptions as sources of feeling and meaning in order to develop a methodological material to address the environment and build a theory of learning based on a wide range of adult inputs. Calls for speculating and expressions of personal preference.

F. Emphasizes the inductive approach to inquiry, perceiving or describing overall qualities, the relationships between elements to arrive at criteria. Its interactive because it
uses a moderator to clarify and draw people into the process of describing the works.

Braverman's article becomes deceptively pertinent after several reads when the elegance of this perspective becomes apparent. It also comes to the point about art museum content and lack of validity—where "validity" is defined as the degree to which a test measures what it is intended to measure. The analysis is, in my opinion, cogent and assists the educator in making some sense out of the data this is available.

Braverman calls for museum educators to begin to develop "theories on learning by a wide range of adults," and to examine the exhibit information that exists or is factored apart from the usual art historical content. He calls for studies that reflect "motivations" and "attitudes," in the context of desired outcomes. This is important because not many studies address adults over children, and in fact require the adult (and everyone) to accept the museum view, although the science museum reports I cited in Chapter III say that they are willing to modify an exhibit based on visitor likes and dislikes. Few teaching/learning strategies are mapped out for adults over children, according to my study..

Interesting is Braverman's recognition that few museums address the visitor's "cognitive" goals (i.e. most are the cognitive goals of the museum), experiences, or attitudes, although these are certainly present as motivating factors. His contention that the art exhibit should be seen in terms of "hedonic" responses (the
happiness or pleasure of the individual) would seem to function the same way that the science museum suggests for emphasizing "fun" as a primary objective. He points out that this method has been used successfully in researching other forms of "civic consumption" such as dance, drama, and music, and that it elicits good data for "influencing" the visitor's future decisions about attending museum activities. My concern would be that this does not measure "learning" however.

Draverman points out that this type of research would address "educational goals" for attendance and program participation. The focus group method he advocates seems to be an effective interpretation of the formative evaluation process, particularly having to do with sample size and ability to generalize to a population.

Case #4


Unlike traditional didactic materials, such as wall labels, brochures, and audio guides, the new video technologies can present information in more than one medium at a time and can be tailored to deliver a variety of different messages, according to Levy. Levy cites the director of the Getty Art History Information Program as saying that "these multi-media systems offer the potential to draw
viewers into enormously rich contexts of place and time," and can bring together objects, built works, and events in ways that would otherwise be impossible.

Levy writes that the interactive videodisc is especially well suited to teaching the visual arts, with their unique ability to integrate still and moving images, texts, and narrations in a way that allows viewers to pick and choose the areas they wish to study. Using videodiscs also enables museum visitors to be introduced to types of art that might otherwise be inaccessible, and prompts them to think about works in a new way.

Each of the Getty videodiscs contains an overview of the featured art form, along with in-depth looks at iconography, production techniques, and functions. The manuscript program, for example, covers both religious and secular works and live-action sequences showing the "intricate making of manuscripts, the preparation of the parchment, the writing of the text and gilding, and the binding of the book." The "disc helps educate your eye," with the result that the visitor can then go back to the exhibit and see things that may have missed, or that they want to explore further on their own.

A consortium of the education departments from the Art Institute of Chicago, the Museum of Fine Arts Boston, the Brooklyn Museum, the Metropolitan Museum of Art and the Museum of Modern Art New York, the National Gallery of Art in Washington, and the Philadelphia Museum of Art is working on a project involving
interactive video on Impressionism and Post-impressionism. The aim of the program is to create an extensive data bank containing works from the seven member museums and other collections, along with historical and related still and moving images of the period, with audio sources and written materials.

The program focuses on four paintings and deals with the social, economic, political and art-historical contexts within which the artists worked, according to Levy. "Visual literacy is only meaningful within a context," says one program director, and the consortium wanted people to "look at art in ways that will bring out the works' different meanings." This can be accomplished by incorporating information with analysis and looking.

The Consortium is also developing classroom preparation materials for use by schools who come to visit museums, knowing that "classroom preparation in advance of a museum visit can be as valuable as any information students might receive during the visit." Another aspect of the project is to produce a "Teacher's Prototype," to be used by art teachers in the schools.

A separate museum education research team has developed an interactive videodisc that enables children to electronically explore a Mayan ruin. The objective is to provide a discovery-based, exploratory environment which introduces children to archaeology, and shows them something about how to do research.

The Getty is also exploring the possibility of reaching potential museum visitors at home by the use of cable, according to
the article. And, also being developed is a "critical inventory" of existing films and videos on art, archaeology, decorative arts and architecture with an expected annotated index of 30,000 entries. These can be potentially accessed by museum educators and curators for the purpose of developing "didactic components" for special exhibitions.

Although the use of video and computer reproduction can provide some information, its use for stylistic analysis is impossible. Because of this, many professionals, according to Levy, are looking into the application of HDTV and digital imaging technologies for these areas. Nothing substitutes, however, for the "real thing."

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. The video disc technology use for access to art information has the goal of providing richer context for learning, and the computer/disc still has the ability to provide the novel experience. It is also recalling relevant, prerequisite information, such as what events led to the creation of an artwork, would organize content and suggest organizers, it would provide prompts and cues, clearly presents examples and would provide practice in the sense that the material could be reviewed. It would also provide feedback if it
were programmed to be used for learning data.

B. Concerning motivation to learn and develop positive attitudes about a subject, clearly the novel of the video disc device is attractive, but moreover is the depth with which one can access contextual information from one station that is perceptually easy to accommodate. Learners are going to be able to experience a high degree of success and the program will model interest and positive attitudes.

C. This method of inquiry will also foster cognitive skills in problem solving, thinking (both about an art work and in the use of the computer), and in the intellectual domain for concept learning. It provides for contextual information in time and place, brings together objects, built works and events, and is said to prompt thinking in new ways because it also includes information about political events, social and economic factors and art history which heretofore would not have been included in an analysis. It also provides for practice and could easily show positive and negative examples of a class of objects. It would provide directions for problem solving and students or visitors could also demonstrate what they have learned. My criticism would be that it does not reference the exhibit or the art object in the sense that one has to use the actual object in another location.

D. It makes use of the learner's individual style by presenting
what I would say are inductive and deductive opportunities, provides some hands-on work (by using the computer and by being able to see a referenced work), is multidimensional providing sight, sound and written materials. It does not address social needs, in my view because it is used in isolation, i.e. one is interacting with the computer and not other people or the art object.

E. This method of inquiry could be used to critically analyze art works by not only suggesting how to look, but could heighten ones awareness of the elements of an object or of a concept by providing "concrete" or specific examples. It can build vocabulary, encourage speculation and lead to critical judgements based on the rich data.

F. I interpret this method of inquiry to afford inductive and deductive approaches, because one can look at examples from a period of art, for example, and then examine the individual objects or the individual cases—such as what I am doing in this paper.

Levy identifies the major benefit of the new video technology as being one that is able to offer the potential learner "context" for information that can be presented in a multi-media format. As discussed in a previous examination, context in the sense of "learning" is said to influence "retrieval" and for this purpose assists the learner to providing information about place, and time as they are able to see examples of built works, objects, and
events. The video disc, for example, allows the user to benefit from multiple sensory input, each together being able to provide a richer source of information for processing. The more information that is available through the senses (seeing, hearing, touching) the more context.

The more information that can be processed the more likely it is that the learner will build a broader "schemata," through accommodation. This is a theory of Piaget that says that a person assimilates new incoming information into existing cognitive structures (assimilation/accommodation into schemata; or short-term memory to long-term where it is stored). The more context that is offered the more likely it is that the mind will be able to retrieve the relationships, and make new connections. This is very similar to what the computer is doing, in the act of making the various connections using a variety of media referents, providing for contextual richness.

Aside from providing the learner with a richer "opportunity" to access and accommodate information, the computer/video tool will also provide information that will facilitate better research possibilities. Levy acknowledges the "discovery-based, exploratory" aspect of the computers research design, so one assumes that there are no preset outcomes.

One of the dilemmas that occurs is suggested by Levy in that the video disc learner becomes limited in his analysis because he does not have the benefit of the "real" object at hand. It is
believed that the computer icon can become too abstract and that the information about size, shape or texture may not be transferred. A key element in the discussion of the use of media in learning is what Salomon (1979) suggests about how symbol systems of media affect the acquisition of knowledge.

Symbol systems highlight different aspects of content, they vary with respect to the ease of recoding (using what is learned or decoded, or assimilated), specific coding elements can save the learner from difficulty elaborations, symbol systems differ with respect to how much processing they demand or allow, and symbol systems differ with respect to the kinds of mental processes that they call on for recoding and elaboration [elaboration is defined as the adding and extending of meaning by connecting new information with knowledge already in long-term memory—Woolfolk, 1987].

Finally, the computer does have the benefit of being interactive, and self-paced which allows the learner to fully master the material.

Case #5


In the United States, campus museums are intended to serve teaching functions rather than for research, yet American campus museums do not seem to fit very comfortably into the halls of academe, according to Zeller. The "teaching faculty and community
of scholars" often look with suspicion upon museum staff, whose research is applied, aimed at a general audience, and who keeps records of objects, cares for and displays them, prepares object labels, and whose writings are more descriptive and analytical than scholarly in the traditional sense.

Small scale exhibition catalogues often lack the scholarly trappings that promotion and tenure committees and administrators look for in faculty publications, says Zeller, and may be "schizoid" because although they exist in an educational institution, they take the civic art museum as a model. On the other hand, where the campus art museum is run in close collaboration with the art history department it tends to become a "full-scale, full-color illustration of the historical period taught." And where the studio department dominates, "the museum serves to exhibit the work of the teaching faculty and selected students."

What should the role and function of the university art museum be? According to Zeller it should look to the campus community as its principal but not exclusive audience. Within that community it has a responsibility to act as a corrective to the slide-show formats normally given to students of art history in "darkened lecture halls." Zeller also suggests that the campus museum should provide an opportunity to study the lesser works of the masters and the masterpieces of the lesser artists, and provide art history students an opportunity to practice their critical and connoisseurship skills.
Art students should use the campus museum to study a wide range of media, techniques, styles and subjects, and the museum has a duty to help make students aware of what is going on in the Art world. The museum should also play a major role "in training professionals and art history scholars, in producing research and published materials of its collections and in the preparation of exhibition catalogues as well as didactic materials.

The museum has a major obligation to participate in the preservice and inservice training of art educators and elementary classroom teachers, according to Zeller. He goes on to say that the "needs and interests of art education majors have been ignored by most campus art museums," and if public school art teachers are to go beyond studio and crafts instruction they need to learn ways in which art museums can be utilized in teaching art criticism and art appreciation.

Zeller says that the "aesthetic education movement--basing its work on the research of Dewey, Bruner, Arnheim, Gombrich, and others--maintains that artistic perception is...the consequence of past experience, teaching and predisposition," p. 93. Thus the campus art museum should give students and art teachers the knowledge base to teach aesthetic perception, and the basic part of a K-12 art program.

Campus museums must adopt a policy of reaching out to other departments in the university and encourage them to use the museum's resources in their own instructional and research programs. Such an
interdisciplinary, "humanistic" approach will combine the visual, literary, and performing arts in ways that could link up with course offerings from many other departments.

Most people, Zeller goes on to say, do not want to learn how to make art, but want to learn how to experience art. The greatest challenge and the greatest opportunity for the campus art museum is in "devising effective programs to help more undergraduates learn how to understand and enjoy art," p. 94.

Campus art museums can also begin to teach people how to learn from museums, and to appreciate their special "experience-learning capability." These museums also have a unique opportunity to "experiment" with programming without the burden of having to spend huge sums of money on marketing and media hype, says Zeller, nor worry about unfriendly art critics. With the academic expertise available, and a potential captive audience, campus museums can make significant contributions to the field of museology. Campus museums can also be ideal laboratories for individual empirical research projects, and also for longitudinal studies.

Critical Analysis.

This article is based on the campus art museum fulfilling the role of an instructional media and can be evaluated for that purpose. Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. In the sense that the report advocates using the art museum
and its objects as an enhanced opportunity to study real objects vs. a reproduction in a book, it would be a novel and attention getting event in that environment. Use of this venue would provide for practice.

B. Motivation and attitude development. Making full use of the campus museum as an instruction material will enhance motivation because the experience of seeing a "real" art object is much greater (more sensory and exciting) than deal with a reproduction in a passive (dark room with slides) and boring setting. Being able to critically examine a real object of a "lesser" artist would be positive for the student, and offer an external reward when as information is revealed, i.e. what elements in that art object contribute to it effectiveness. It can pair subject matter with things that are attractive to learners, such as having the opportunity to engage in practicing their critical skills in a meaningful way.

C. Concerning methods for teaching cognitive skills, the fact that a student could begin to use the museum for analyzing real objects, could have the benefit of critically evaluating objects for class and non-class examples, and could engage in unlimited practice with the materials that afford rich sensory data would ensure the building of concepts, of learning principles, and solving problems in the study of media, techniques,
and solving problems in the study of media, techniques, styles and subjects.

D. This report considers the learning style by offering the sensory richness that I note, is inductive and deductive (one can study individual objects or periods and styles under the heading of Art), and certainly enhances the opportunity for physical and emotional needs--by seeing the real object in its own size, color and weight. It also allows for learning with peers, or without.

E. Clearly this use provides for perceiving obvious and subtle qualities of an object, for interpreting perceived qualities and sources of meaning (reading about a painting in a book is different from seeing the painting on the wall), and would provide the first hand information necessary to make a judgment.

F. The use suggesting in this report would allow for an inductive, deductive and empathic approach, and because the report suggests using the campus art museum for training educators, helping students and for interdisciplinary study, it is interactive.

Most art history and studio classes study major art works as examples from slides or reproductions. A picture of a large scale Jackson Pollock painting in a 10" x 12" book has little to do with the "real" object and severely limits the amount of information that
can be accessed. In fact, studying anything but an original is a study of a reproduction, and doing so for a classroom presentation, for example, ends up being little more than an illustrated art history lesson.

Zeller advocates the use of the campus museum as a learning resource where students can discover, develop, and practice their critical skills. The real object contains the fullest or richest amount of "information" for the student to deal with (or interpret), whether for studio purposes and mimetic study, or for analyzing the formal qualities of a work such as line, shape, and color. Originals also allow for the truest comparisons in terms of case and non-case studies if one were engaging in a critical analysis for the purpose of fitting an unknown work into a school.

It is this inductive approach to learning that provides context that is currently being pursued by the Getty Trust program on art education in their "discipline-based" art education approach. This approach has been introduced in school systems and museums across the country and includes integrated components of art history, criticism, aesthetics and studio for the learner.

Case #6


When we apply concepts of aesthetics to the environment it is often an uncritical convention of beauty, directed in a limited and
superficial way. Environmental aesthetics usually deal with isolated or distant places, such as gardens, parks, and scenic views, or in connection with decorating and landscaping buildings or communities. Environmental beauty, according to Berleant, is seen as a visible feature of the surroundings rather than as an aesthetic interaction between places and their human occupants.

Berleant goes on to say that a visual mode of aesthetic perception usually becomes the model for appreciation, and is applied by isolating the object and viewing it "disinterestedly and contemplatively." The painting, a poem, a symphony or a play is equated with considering it an "object of veneration," to be regarded as something like reverential awe.

The museum of fine art is an environment designed for experiencing art objects, yet, says Berleant, despite its aesthetic purpose those same conventions are often applied as uncritically as anywhere else. The prevalent view of aesthetic appreciation is that it requires disinterested attention "fostered by maintaining aesthetic distance," is most typically found in the museum of art.

This leads to presenting art works as discrete objects arranged in visually pleasing arrays to be viewed at some distance. The "temporal rhythm" and "perceptual sequence" gives way to the demand of proximity or distance imposed by particular paintings, with little regard for the conditions of experiencing the art works individually. Size in relation to each other is usually the primary
criteria for placement on the wall, leaving the viewer with the effect of objects "adorning a large surface."

Perleant goes on to say that "considering paintings as objects fosters a quantitative approach to exhibitions." To do this is to replace "the aesthetic of objects with an aesthetic of experience" in the museum. This requires a clear sense of the museum as an environment which fulfills itself when it functions as a place of involvement, with the special purpose of promoting aesthetic experience of art works.

Perleant proposes an "active perceptual engagement with the art work," with an involvement that is intimate enough so there is "experiential continuity between viewer and work." This he says is not merely visual or physical but demands that perception be joined with imagination and conscious association of memories and meanings.

How is it possible to arrange "experiences" rather than objects in organizing exhibitions based on an aesthetics of perceptual experience? One of the most basic factors affecting the perception of paintings, according to Perleant is the "optimum distance for regarding the work most effectively." A late Monet, he points out, needs to be viewed from a distance so that the "chaotic surface can resolve into dynamic shapes." When this is not done, as in the hallways and smaller rooms of the Marmottan in Paris, he says, the "paintings are unable to work and are simply lost to the viewer."
One the other hand, the "activity-filled" paintings of Bosch and Guardi, or the "intimacy of Chardin," require a close eye to pursue detail on the pictorial surface. Physical distance profoundly promotes aesthetic distance (affecting the disinterest), but interference from objects and people in the open space can make it impossible to achieve the viewing distance that some paintings require.

Berleant states that if we were to recognize perceptual differences among paintings, for example, and acknowledge that appropriate physical distance is a precondition for perceptual experience to occur, we would begin to arrange art objects to permit and encourage the viewer to participate in this manner. As an example of what he means, he says that landscapes and seascapes lend themselves to different kinds of experiences "centering on perceptual qualities of light, mass, space, or water."

One could then bring together paintings that convey differences in the visual sense of light (shadowy, brilliant, lucid, sensuous, suffused). The openness of van Gogh landscapes could be contrasted with the filled one of Rousseau, Gaugin, or early Kandinsky, he goes on to say. Berleant also suggests that there are endless opportunities for "imaginative juxtapositions," such as Duchamp's descending nudes against the domestic interiors of Vermeer, or the "varied consciousness toward women" found in Leonardo, Rubens, Picasso and Rembrandt, deKooning, Modigliani or a Schiele.
Berleant stresses that his central theme becomes one of designing museum experiences that offer a perceptual parallel or contrast [concept-of the class or not of the class], and not, for example, a theme about the "rendering of towns...but the sense of experiencing towns." By "presenting art objects in ways that encourage their own unique perceptual qualities," and by "arranging art into sequences of experience," Berleant says that museums can transform themselves into opportunities for enlarging consciousness and enhancing our understanding, vis a vis "participatory aesthetics."

Critical Analysis.

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Designing instruction has the effect of organizing the data for learning and causing the designer to organize. This report does not indicate that learners are to be informed of outcomes, or that a novel event is to be introduced to gain attention. I assume that since the educator is directing a novel approach to looking in this environment that gaining attention is an intrinsic part of the "instruction." The instruction is predicated on the use of examples to illustrate points.

B. Motivation and attitudes development. This report cites the objective of modifying the "aesthetic of objects" to
the "aesthetic of experience" and I would assume that engaging the typical art museum visitor in a new way of looking would motivate and shape positive attitudes. By making new connections to art objects learners would be rewarded by the approach.

C. Cognitive skills. Thinking and looking, considering both visual and intellectual contexts, and the presentation of clear and non-case examples, and the opportunity to actively practice critical skills would be available. Problem solving practice, with direction and guidance is part of the authors strategy.

D. The report considers the information processing style of the learner by developing visual skills in looking and how to utilized the senses of perception from stimuli that is be organized and for physical and emotional needs, exploring feelings and meanings in a directed, constructive ways.

E. Clearly the report encourages the discrimination of basic properties, perception of obvious and subtle qualities, the exploration of connotations and particularly becoming aware of contexts. Uniquely, it also differentiates between disinterested distance and what my criteria refers to as the interpreting of perceived qualities of feeling by maintaining "psychic" distance. It also offers opportunities to speculate.
F. The approach specifically calls for an inductive approach to case building to describe basic characteristics of works, to perceive relationships between parts, and to perceive aspects that relate to experience. Based on this criteria, I believe that the approach is deductive because it developed and employed a criteria, and empathic because it emphasizes the purely visual qualities of art work as a means of organizing access.

Berleant is describing the distanced, visual mode of aesthetic perception as being predominant in the art museum setting. We study art works as discrete objects, where each is mostly presented to the perceiver as visually and intellectually isolated, thus robbing the visitor of the opportunity to participate in the "active perceptual engagement with the art work" that he seeks. He calls for an "intimate" experiential continuity between viewer and work.

To do this he suggests that museums arrange "experiences" rather than objects, and thus base the aesthetical response on "perceptual experience." Generally, I believe that he is really calling for what Robert Gagne (1977) refers to in his types of learning outcomes as the "affective component" of attitudes. He says (p. 220) that "planned outcomes of attitude learning, whatever their specific nature, are definite components of educational programs," for children and adults. The affective aspect is that "feeling tone" of these "learned internal states."
Gagne describes the "attitude" as being one that varies from "positive to negative" which represent two dimensions. One is the "behavioral tendency" of seeking versus avoiding, and the second dimension he says concerns the "liking" and "disliking."

The suggestion that exhibits be arranged according to "experiences" in order to afford the active perceptual engagement as opposed to the distanced aesthetic approach, seems to address those aspects of cognitive style that refer to field dependence and independence as a way to explain educational significance and purpose. People who are field dependent perceive a pattern as a whole, while those who are independent perceive separate parts of a total pattern.

In art we address field independence and dependence in terms of foreground/background (figure/ground) relationships as to what patterns are perceived as emerging in what I have previously described (Gallant, 1989) in some detail as the innate perceptual attribute or asset of a museum learner (or visitor). This can be utilized by the museum educator or artist when constructing visual information for the purpose of communicating.

Case #7


Although Museums once featured "heterogeneous" collections, "specialization" has occurred over the past century to the point
where specimens illustrating one subject being combined to form separate collections. In some cases, she says, historical societies passed on works of art to specialized institutions as "these came into being," with the advent of specialization and the "great storehouse" concept that museums once had were gradually modified.

This has led to a "schism" in scholar's minds about specialties, and a "mutual ignorance" concerning the propensity for some to treat an object as "absolutely aesthetic" or as "absolutely historical." The "specialization" is not the problem, however, according to Tellier, but the "failure...to maximize the utility of exhibit objects to patrons."

In the history museum an artifact may be displayed with detailed information about the use and meaning of the object in the lives of the people who made it, says Tellier. In the art museum the same object may be displayed in "aesthetic isolation" without regard to its cultural context. The difference in the interpretation of such an object is reflected by this frame of reference, which is identified as being either "aesthetic" or "intellectual."

Tellier claims that both frames ignore the power of an art object to "communicate knowledge, ideas, and emotions." Each frame of reference determines the way objects are presented and, as the viewer's perceptions of a work of art are affected by the way in which it is seen, and by the label it carries, each offers different opportunities for art appreciation.
The aesthetic frame of reference.

- Art products are often studied apart from their cultural contexts.
- The effect of the artist's cultural environment, such as political, religious, and economic systems is usually ignored.
- Although some objects have had "specific functions in their cultural contexts," viewer's experiences have been "emotional" rather than "instructive."
- The emphasis on the aesthetic importance of objects has led to what Tellier calls the "objective" exhibit style, with art objects being completely "removed from their context."
- In this "aesthetic" environment, "uniqueness" is emphasized at the expense of any other kind of significance.

The intellectual frame of reference.

- The object is presented in terms of cultural values and ideas rather than in terms of form and design.
- More customarily, the object is a mere document to confirm a favored theory of cultural development--or to discount an unfavored one.
- Man made objects tend to reflect the belief patterns of individuals who made or used them and thus the belief patterns of the larger culture.
- Viewed as a product of craftsmanship the art object may reveal the range of construction materials, skills, tools, and techniques available at the time of creation, viewed from the
standpoint of its social role, which may reveal information.

- Art objects may reveal information about local social events, disasters, prominent citizens, and town views—such as in the genre scenes.

- When the transmission of information is the primary consideration in a presentation, the viewer is not always placed in the best position for "undistracted contemplation of artistic form."

The "mixed frame" of reference.

- Visitors to the art museum expect to be "delighted" by the beauty of certain works, and enter the cultural history museum expecting to be instructed about history.

- In the aesthetic frame of reference, curators and visitors tend to focus on the formal qualities of the artwork, and "fail to recognize the historical value of individual objects." In the intellectual frame, curators and visitors focus on the object's identification, factual description, and context to the "exclusion" of other factors "that would contribute to the appreciative experience."

- Museum curators and visitors often fail to realize that objects in the history museum are of unique aesthetic value, and objects in the art museum may have historical significance.

- Art objects can be seen individually and collectively as manifestations of the culture that produced and used them.
Displays can be designed to facilitate aesthetic apprehension and intellectual comprehension of artworks.

According to Tellier, museum collections offer the longest and widest range of evidence about the past, and exhibits serve as vehicles in which objects are arranged to prompt new interpretations and to encourage viewers to experience collections in new ways.

Critical Analysis.

This example of how to design an exhibit has more to do with intellectual perspective than with subject matter. Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. The report calls for the organization of content and would probably present organizers for the learner since "organizing" information is the subject of the exercise.
B. Motivation and attitudinal development. Putting objects into a mixed-frame would have the effect of opening up new ways to think about and access information, and so students would be encouraged to change their set perceptions.
C. Cognitive skills development. The report indicates that objects "communicate" knowledge, ideas and emotions and suggests that frame of reference and context affects perception. Informing learners that an object has a multiple set of data would encourage problem solving. This report calls for changes in class and non-class
discriminations and would provide for practice as each is considered in either the historical or aesthetic field.

D. The design considers the learning style of the visitor because it provides for a more inductive approach to the information, i.e. an object that was classified as historical is only considered from that perspective, but in the mixed frame it would encourage inductive synthesis.

E. The approach to discovery suggested encourages a richer context and so would encourage an increased opportunity to perceived qualities in a particular object, and to make more connections.

F. The approach emphasizes the inductive approach, and for a new way of describing basic characteristics, relationships, and new ways of interpreting ideas and themes.

All of Tellier's points are well taken about the various ways in which objects are interpreted based on the museum curator's imposed frame of reference—and how it is interpreted as "context."

She also offers the reader a full set of examples that adequately define the term "concept" based on her empirical knowledge of the topic. There are three organizing categories which make up her concept of how educator's interpret a collection. Those are the aesthetic, intellectual, and mixed frames for reference, communicating the object's "knowledge, ideas, and emotions."

For considering the ways in which people communicate ideas under frames of reference, K. Tribe, in his article on the "History
and the Production of Memories," (1987) writes about the phenomenon known as "popular memory." This concerns what Tribe calls the "interconnected threads" of a new social history approach, and I see it as relevant for summarizing what the result of Tellier's suggestions may mean.

The concept of popular memory concerns the "transformation" that takes place "from history to memory" and "from memory to history" where, in both instances, according to Tribe, the interpretations are mediated by a work of production. Moving from history to memory, history is seen as a collection of past events, incidents, significations, and persons. When this is conceptualized into a work of production (such as an art object) we move to the "presence of memory," where we put the traces of history into the present. This, says Tribe, is manifested in the trace of what is recorded and in how the "commemorative event" is constituted.

"History" denotes a non-discursive (non-connected) past and discursive present, as those pieces become constructed. The past, he goes on to say, has the effect of informing and underwriting the validity of the present (Historicism), and the "writings" (or record, or object) of the past are guaranteed by their very involvement with the past. The "history" component is thus constituted as the truth of the past and the present historical account of it.

If you go from the right to the left, or from memory to production to history, the relationship changes and this is a
process where specific materials are combined and used to fabricate a history. Its validity is disconnected from the simple existence of the prior chronology and it is thus not valid by principle only. Because this occurs, in the case where memory to history is not automatically valid, the history to memory direction "allows" historicists, Tribe says, to restore agents of history into a construction.

History, or in Tellier's case the concept of an object, is effected by a frame of reference. This is particularly so in the museum where objects are interpreted to be valid referents or evidence of history. The point may be that it is entirely possible to construct a history or a meaning based on the frame.

I introduced the point about popular memory because "historical research too often appears to be its own method of validation" (Tribe). This view makes the case for Tellier's "mixed frame" of reference by museum scholars because objects certainly have both historical and cultural (and one can include an understanding of the aesthetic of a people, in Tellier's outline) significance.

Case #8


How do children learn in museums? How can museums increase the educational effectiveness of their exhibits and programs?
According to the authors, the research does not focus on teachers, exhibits or programs but on the museum's major client population—children. The article explores the rationale for the child-centered museum experience as related to a "specific body of psychological theory."

Matthai and Deaver have concluded that museum professionals are unaware of the theories and research findings on learning, and psychologists and other social scientists "are unaware that museums are places where the learning process might be studied." Reasons for this are that:

- Each publishes and reads only their own specialized journals.
- Museum personnel are usually selected for subject matter experience or technical skills, not for their training in education or psychology, and are consequently unfamiliar with the literature on "learning."
- Museums tend to emphasize and reward scholarly endeavor in science, art or history, and underplay staff accomplishments in educational theory or practice; there is little incentive for staff members to study learning theory.
- Many museum people accept that visitors—especially children—will learn something simply by being exposed to exhibits and educational programs.
- Many museum people assume that one can teach children through intuition and practice, and create comprehensible exhibits without reference to relevant learning research and theory.
Psychology has sub-disciplines, such as social, clinical, behavioral, abnormal and developmental, and it is difficult to know which would be relevant to museum education.

Learning theorists and most professionals have developed their own jargon and methodologies which may be difficult for the casual reader to access, for the purpose of improving museum education.

According to the authors, a museum visit usually has several educational goals: to supply facts, to supplement or complement a school lesson, to provide exposure to objects and experiences that cannot be obtained elsewhere, to provide an esthetic experience, to alleviate boredom, or to provide a pleasant experience. Further, they say, "what a child can and does learn during a museum visit is shaped by that child's culture, prior experience, understanding of the teacher's language," and their reaction to the teacher and the museum in combination with their motivational levels.

Matthai and Deaver go on to say that a possibly more important yet less visible factor is the child's thinking process. The theoretical basis for this discussion is the discipline known as "developmental psychology." Developmental psychology is based on the idea that as humans grow from infancy to adulthood they progress through a series of stages of physical and intellectual development. Each of these permits more complex physical and mental behavior, as exemplified by the research of Jean Piaget.
What is relevant here is that the "stages seem to set limits on a child's intellectual capabilities," which limits what the child can learn at a given age. In terms of museum education, "many of the abstract concepts that museum educators try to teach younger children may simply be beyond their comprehension." Secondly, museum exhibits may be conveying "unintended—or incomprehensible—messages."

The authors recognize that "one of the unique strengths of museums as learning institutions is that they contain many real objects." Educators and exhibit designers, they believe, tend to use these objects as vehicles to express more abstract ideas, such as "evolution, ecology, historical time, and artistic style."

Because younger children cannot deal with many abstractions, they may instead focus primarily on the objects' "size, color, or other physical characteristics," without realizing the relations among the objects and the historical, scientific, or artistic context this is supposed to be represented. Adults, they go on to say, associate a number of meanings and ideas with a given object, but "for younger children these associations are incomplete or absent."

Matthai and Deaver offer an example from their research to illustrate the point about a child's ability to comprehend the "abstract concepts of age and history." As they state, when younger children were shown a pair of rocks, one large and one small, they almost "invariably respond" that the larger rock is the oldest.
Many younger children, they go on to say, also believe that a large painting is older than a small one, and that a painting of an old-looking object and is older than a painting of a new-looking object. A "dirty object" is also perceived as older than a shiny one.

The point that the authors say this makes is that children's (from across socioeconomic and ethnic levels) thinking processes do not allow them to separate dominant physical characteristics—such as size or shine—from an abstract and difficult concept, "age."

Young children also show "enormous confusion" about historical time, believing, the authors say, "their grandmothers, George Washington, and the dinosaurs" were all contemporaries. The confusion arises from their inability to deal with the abstract concept of time.

Other abstract concepts that children may have difficulty with are cause and effect relationships, moral values, esthetic judgements, and artistic styles.

It is also noted that children's intellects are developed through "direct involvement and participation in activities," as they (as is everyone) need to be "active, not passive learners."

While the mature intellect grows through manipulating abstractions, say the authors, younger children "learn less from symbols (written and spoken words) than they do from hands-on experience and participatory activity."

Matthai and Deaver suggest that the important implications of their findings for museums is that guided tours and extra
labeling are only superficial solutions to addressing the needs of children in the museum. Museums also need to teach teachers, museum educators, exhibit designers, and curators about the "intellectual capabilities and limitations of younger children." Younger children are fully capable of comprehending names of objects and descriptions of simple functions and relationships. One may not be able, they say, to teach younger children that "gazelles are mammals if a child cannot comprehend the idea that there are classes of animals," but they can understand that gazelles eat grass.

**Critical Analysis.**

Although written in 1976, this article was included for study because it contains a good portion of material and offers sound advice for the museum educator. This particular piece is one of the materials given out to museum docents in training at our local art museum, and is significant for the fact that it is used to educate the educator.

The authors cite Piaget, Elkind, Inhelder & and Kohlberg in their bibliography. The content of the article stands on its own as a model for educational analysis. Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. Concerning advice for an instructional material, the report emphasizes the organization of content to fit the learning style, or developmental stage of comprehension for children.
As an instruction material it let us know about its expected outcome, offered examples, and organized the material. As an instructional material to be handed out in the museum it would be an excellent organizer, calling for the application of knowledge.

B. Motivation and attitude development. Students will surely be encouraged to study what they can comprehend, and making certain that information is presented in a manner consistent with a level of comprehension will motivate and encourage. The article was written in a way that would encourage the teacher to go out and apply the material.

C. Cognitive skills. The specific intention of the article is to foster intellectual access by children to the educational material that can be made available in the museum. The article advocates the use of concrete elements to build concepts and not to rely on the child to be able to deal with abstractions. While the article does not offer a step by step plan, it does deal broadly and constructively with learning theory and specifies that children must be active processors of information.

D. Information processing. Children are active learners, best at inductive and process handling of information, and do not comprehend abstract interpretations about moral values, cause and effect, and aesthetics.

E. For looking at art, children perceive obvious and subtle
qualities, can discriminate basic elements, and they can build a vocabulary.

F. Use the inductive process for looking at art objects, children perceive aspects as they relate to experience, and care should be taken to be aware of the child's culture, understanding of language, and reaction to teaching.

Case #9


Critical analysis is an orderly and sequential process, and art criticism needs form or a system, to make the best possible and consistent use of "our knowledge and intelligence, and powers of observation."

Art-critical performance, according to Feldman, can be divided into four stages: Description, Formal Analysis, Interpretation, and Evaluation or Judgement. Their sequence proceeds from easy to difficult, from specific to general, first focusing on particular visual facts before making inferences about their overall meaning and value.

Description. This is a process of "taking inventory," and of noting what is immediately visible in an artwork. At this stage "we are interested in avoiding inferences, judgments, or discussion of personal feelings," and want to arrive at a simple account of what is there. Feldman states that in "description," the language of the
critic should be as "unloaded" as possible, and it should not
contain hints about the meaning or value of what is being described.

This is also the stage where we are "finding" what there is to
be discovered, and the first step is to look for "obvious things." As the imagery grows abstract, "we should describe the main shapes,
color, and directions." A shape may be ovoid or rectangular, large
or small, hard-edged or soft-edged, but they should be described
without being judged--such as they are "beautiful."

The "characteristics of execution, or the "visible"
characteristics can also be noted. Has the paint been brushed or
mixed on the canvas, are there several transparent layers or one
coat; or in architecture, do we recognize the structure as being
cast iron or brick. The "process of fabrication" can also be
described, such as was it hammered, stamped or cast. Can we see the
marks from the tools that were used to make it? Answers to these
questions, according to Feldman, "affect our perceptions of an
object, our understanding of its form, and our feelings about its
use.

Formal Analysis. This phase goes beyond a descriptive
inventory to "discover" the relations among the things that have
been named. For example, figures that may have been described in
the description phase are now examined as to their organization as
shapes, colors, and textures--as "forms with particular locations in
space." Do the colors model the forms, are there any perspective
devices or is the space "shallow?"
Feldman says that the "viewer's expectations are very important in formal analysis. On the basis of what we see, what do we expect to see? In making the formal analysis "we have been accumulating evidence for interpreting and judging the work," and we have also begun to move from an objective description of forms to a statement about the way we perceive them, according to Feldman.

By engaging in this phase of the process, we have been "groping for a principle of organization, an idea that can account for the way the work is structured." We have "tried to be objective in our description," and have identified the subject matter, examined the main form relationships, and have "tried to build a consensus about the visual facts and their behavior." How do they add up?

**Interpretation.** Interpretation, says Feldman, in art criticism is a process of finding the overall meaning of a work that the critic has described and analyzed. This does not mean that the critic attempts to find verbal equivalents for art forms, nor does it mean judging the work. Interpretation is the most important part of the critical "enterprise" and involves discovering the "meanings of a work of art and stating their relevance to our lives and the human situation in general."

One of the critic's tasks, says Feldman, is to "discover [the artist's]...ideas and communicate them to others." We are not primarily interested in whether these ideas are faithful to the artist's beliefs, but are "interested in the fact that art objects
become charged with ideas," even those that may enter a work without
the artist's conscious knowledge.

Although artists are "not necessarily the best authority on the
meaning of his or her work," we are interested in what artists think
about their work as a part of the analysis and interpretation
process. Feldman does not believe that critical analysis is a
substitute for the "aesthetic experience," but if the "visual
content could be verbally expressed, it would not be necessary to
make the artwork in the first place."

The function of language in critical interpretation is to deal
with the formal and sensuous qualities of the art object in terms of
its impact upon our feelings and intelligence, according to Feldman.
By engaging in the critical analysis we are trying to formulate a
hypothesis by our "tentative interpretation of the facts." "In
Science, more than one hypothesis can account for a given
phenomenon," and the same is true in art: more than one hypothesis
can explain an artwork.

With these factors taken into consideration, it "is
important...that the interpretation be responsive to a particular
set of visual facts."

Judgment. Judging a work of art means giving it "a rank in
relation to other works of its type," and making comparisons with
historical models. In making a critical judgement, Feldman says
that we should relate a work of art to the widest possible range of
comparable works. Comparing current works with those of the past
does not imply "imitation" but are to be employed "intelligently" to serve as benchmarks or touchstones of excellence.

Technique is relevant in this context, and the role of craftsmanship, mastery of technique, skill and facility, says Feldman, and facility in the use of materials has to do with the proposition that "art is making." Art is "idea and materials simultaneously united by technique," and in criticism we cannot afford to ignore craft or technique because "making and forming processes are expressive or satisfying in themselves."

**Critical Analysis.**

Applying the criteria for evaluation that I outlined in Chapter II (A-F), I find the following to be true of this example:

A. This report organizes content and present organizers, and encourages progressing through the analysis from simple to complex. It specifically uses "concrete" examples as the object of the analysis, and is purposely providing for practice.

B. Motivating students to learn and developing positive attitudes. In my view, the approach depicted in the report clearly demonstrates that acquiring these techniques will be an important asset to one's ability to interpret art objects. Students would experience success and accomplishment by engaging in the process, because it is the process that is the key outcome of the experience.
C. Cognitive skills. Clearly the approach to criticism suggested in this report encourages thinking, analysis, and problem setting as well as solving. This method is about building a concept by inductively analyzing an art object. It does not so much look at objects in a class, but in the elements of the object to come up with the concept contained in the object. It also strives to make the analyst aware of the relationship among concepts, such as from one art work to another. I would suggest that there is unlimited practice potential for someone who has the keys to unlock the information contained in an art object.

D. The learner. This report is designed to move from easy to difficult and from specific to general, and so this will accommodate the child and adult on the concrete to abstract continuum. It is inductive and moves to the deductive, it can be self-paced, it is mainly visual, and its allows for the factor concerning how we bring our own experience to a work of art (or really to any problem solving situation).

E. Critically responding to art, this report follows all of the guidelines set forth in my criteria, as cited from Chapman (1978), for perceiving obvious and subtle qualities in the art work, for describing and interpreting qualities as a source of meaning, and for coming to some "judgment."

F. In this approach we by design move from the inductive to the deductive, where after analyzing works we can come to some
broaden understanding of concept, i.e. all the evidence points to the fact that this painting belong in the impressionist category. One of the things that Chapman does not emphasize, however, is the importance of craft which is a positive element of coming to an appreciation of art objects, in my opinion.

Feldman's method for coming to some understanding of an art object would be a significant way to approach any problem solving situation, and so the modes can be broadly applied, in my view, to all learning. In my opinion, making art or looking at and analyzing art is a means of intellectual development that can be transferred (as noted) to other situations, particularly in an environment where linear type thinking (such as non-creative work with computers) is predominant.

Synthesis of Art Museum Education Programming

Art museums are object-centered environments by nature where each painting, sculpture or photograph has its own unique story to tell. The interpretation of that tale can be variously influenced by the frames of reference the museum may impose, and is sometimes aesthetically or historically significant according to Tellier.

Perleant suggested that the art museum should be a more participatory environment than it is now, and called for an end to the distanced aesthetic attitude response. Achieving this outcome involves the replacement of the individual and isolated
object-on-the-wall-approach to the museum experience with an active perceptual engagement-approach, based on content themes using both affective and cognitive inquiry.

The cases presented in the study were about art museum education, and addressed issues about context, content, and how best to provide a learning opportunity for the visitor who is a voluntary participant. Most of the authors gave us their view of how to explain an abstract concept in concrete terms, enabling a majority of visitors to reach some understanding of what they see in an art object.

The educational theories of Gagne for hierarchical learning and outcomes as aspects of the affective domain appear in these examples, as does the discovery learning principle of Bruner. In my view, one must continue to point to the fact that the study of art as a problem to be solved elicits multiple solutions that may be equally correct, and it is this factor that makes discovery and intuitive thinking strategies ideal.

Developmental constructs vis-a-vis Piaget's stage theory were put forth as a guideline for parents and museum docents who confront art objects with children, and several of the authors offered inductive strategies for taking a "critical" analysis look at coming to grips with the need to decode the symbolic and connotative information of the art object as constructed by the artist. It is suggested that the interpretation of an art object can be subjective (i.e. may not need to be objective), which leads to another
unanswered philosophical question about whether all the information to be interpreted is in the paining waiting to be uncovered, or is it the interpreter that supplies the information.

Similar to the museum curator's frame of reference theory, people also bring a variety of frames with them. These influence individual interpretation—which many believe to be exactly the unique feature of studying art vs. science which as controlled outcomes to reinforce known phenomena.

Braverman's focus group notion for descriptive research comes closest to what other museums seem to be doing in terms of formative evaluation, and toward taking into account the actual perceptions of museum visitors as a means of getting them to the museum so that they can have the opportunity to learn. It clearly seems to me that the art museum concentrates on the object for its subject matter, whereas the science museum concentrates on the exhibit.

My findings as a result of applying criteria that was based on the principles of instructional design, and methods for engaging in critical analysis relative to the museum follows. I note for the reader of my paper that although the criteria I selected are "borrowed" from other domains, the application was rational, and coincided so well in terms of the environment, that I would not hesitate to suggest that this could indeed be the theoretical "model" that the museum profession seeks. I conclude that:

A. 1. None of the nine cases specifically noted the need to introduce a novel event to get the learner's attention
although two of the nine can be interpreted to provide such an event because of the way they approach the subject.

2. I did not find an evidence to suggest that an exhibit or a proposed analysis strategy informed learners of expected outcomes.

3. Five out of nine reports acknowledged the importance of knowing that art and art exhibits are interpreted by visitors based on their prior experience. None called for the recall of experience in order to deal with an exhibit's information.

4. In looking at an art object, all information could be relevant, and in most case reports covered here it was important to limit unrelated variables.

5. Five of the nine reports used organizers as guides to engage in the critical analysis. Instruction is not an exhibit, and if the art object is the "exhibit" it takes organized and systematic inquiry to make some sense of abstract data.

6. All of the reports would agree that moving from simple to complex in an art museum is the best way to approach the subject matter.

7. None of the reports noted the use of prompts and cues as essential elements in getting the visitor's attention, or for the purpose of recall to make connections.
8. None of the reports varied the information per se, but the
two that prescribed criteria for critical analysis offered
several ways to come to some understanding of the same
object.

9. All of the art museum reports suggest the use of objects for
study but none specifically addressed the educational need
to present examples to the visitor for that purpose.

10. The art museum reports allow for unlimited practice, but
only two suggested that continued practice in looking
critically at art would sharpen the "eye."

11. None of the reports indicated that immediate feedback would
be forthcoming.

12. All of the art museum experiences can be reviewed and
repeated but since there is no feedback, the learner would
not be able to judge an progress.

B. 1. Three of the nine reports overtly imply that the learner
would be aware that the subject of the instruction is
important, and then only because the material is being
presented in a new light. One report that had to do with
the learning style of children might be a prime example of
where the learner would be aware of importance.

2. None of the reports presented reasons why the subject is
important because they didn't specify B. 1. However, as an
overview, their process is the reason.

3. I would say that none of the reports arrange for any
external reward that could be quantified, and the personal reward is implied.

4. One of the nine reports could be said to arrange for success and accomplishment because as learners go through the specified process they would come up with some conclusion.

5. Art objects would be physically attractive and so using the approach in conjunction with masterwork's would result in this outcome.

6. One report employed the notion of introducing non-case elements.

7. All of the cases were aware of the goal of modeling interest and positive attitudes toward the subject matter, with two implying that a positive attitude would overcome prior apprehension about confronting the subject matter.

C. Concept learning.

1. I cannot say that any of the reports indicated that they offered definitions as a part of their concept presentations.

2. The museum reports presented examples to support their research, so taken in that light art museum educators are aware of the need to make this point. In the substance of what they suggest be done in their environments, examples of objects was not a factor in their research per se, and no one would infer that art concepts are unambiguous.

3. Only one report deal with this issue and it was
recategorizing objects so they could be synthesized into new concepts.

4. Only one report dealt with this provision.

5. There was no data to conclude that this strategy was being employed from my sample.

Principle learning.

1. There was no data on this from my sample.

2. Three reports designed the analysis process to allow the learner to come to some conclusions about the relationships between concepts.

3. There was no data on this from my sample.

4. There was no data on this from my sample, although the repeated utilization of the inquiry process suggested by several reports would be construed to be demonstrating the principle.

Problem solving.

1. There was no evidence for this because none of the reports was emphasizing the art history approach, in my view.

2. All nine reports presented problems but only three covertly suggested that learner's were engaging in a problem solving process.

3. Four reports provided direction and guidance.

4. None of the reports specifically provided for practice and feedback as a part of their strategy.

D. 1. Information processing style. All of the art museums and
relative reports indicated an inductive approach, with two specifically addressing the issue of developmental stages for comprehension. All examples would be self-paced inquiries, and the redundancy question would apply to repeated looking to discover detailed information.

2. Use of senses for perception or reception of stimuli. All reports were geared toward a visual environment where visual stimuli predominate. None of the reports dealt with printed stimuli, albeit one split her discussion on exhibit design and discussed the history type which offered written interpretation.

3. None of the reports dealt with social needs of the visitor, although one noted that the reason why some people attend the art museum is for social reasons.

4. Two of the reports noted that children like to move around the museum.

E. 1. Perceiving obvious and subtle qualities. Virtually all of the reports addressed this topic, with two being very specific about this inductive approach and the need to build information.

2. None of the reports noted multisensory associations. Two reports emphasized the exploration of connotations, and four stressed the importance of context--for creating your own through analysis or in making some sense of that which is presented in the art object.
3. Feeling and meaning. This is a category that is specially relevant in the art museum setting and one report payed particular attention to this feature as being of major importance in the judging aspect. Eight of the nine reports could be interpreted to believe that this remains an important criteria for the art museum learning outcome.

4. Judging. Two reports included judging as an importance aspect of their scheme for critical inquiry and analysis. Judging appears to be a feature of coming to make some sense out of ambiguity.

F. Inductive approach.

1. Eight out of the nine reports point to the inductive approach as a way to discover or uncover meaning.

2. Two reports emphasized the need to study or develop relationships between parts.

3. I have no evidence of this.

4. Three reports are aware that the art museum information will be interpreted through an individual's frame of reference.

5. One report emphasizes the importance of inductively coming to an awareness of recurrent themes, qualities and ideas.

Deductive approach.

1. There is evidence among the reports to conclude that all four organizing criteria could be employed. One report suggests working form inductive to reach deductive.
2. Two reports propose this approach, as noted.
3. Two reports propose this approach, as noted.

Empathic approach.
1. All of the art museum reports emphasize the obvious.
2. The purely visual qualities are the primary means of access.
3. One of the reports emphasized the use of such devices as analogies and metaphors to relate what is seen to what is felt.
4. Eight out of nine reports realize that the information will be processed based on the background of the visitor. Three overtly emphasize feeling as a way to know.
5. There is no evidence for this in my sample.
6. Three of the reports emphasize being imaginatively involved.
7. Two reports include judging as a part of their strategy for learning.

Interactive approach.
1. I can interpret the museum educator who would use the methods suggested by the reports to act as the moderator, clarifying the role of the learner and the material in the exhibit. Two reports emphasized the need to have a leader or teacher to facilitate inquiry.
2. There is no evidence for this in my sample.
3. There is no evidence for this in my sample.
4. Only one report alludes to this strategy.
This concludes my review and analysis of the art museum education setting, and my study research. In the next chapter I will begin to pull together a summary of my findings to, (1) get some notion about the educational programming now being conducted in the museum environment, and (2) to come to some conclusion about how to provide opportunities for learning in the art museum setting.
CHAPTER V

MUSEUM EDUCATION--AN OXYMORON?

Summary.

The picture that emerges from an analysis of the science and art museum education literature reveals that although each has a distinctly different subject matter, each shares the view of the museum visitor as someone who has the potential to "learn." Museum educators see their responsibility as being that which will provide the visitor with the opportunity to access or approach the information that the exhibits or the objects contain, and to become involved with the subject matter in an active mental and physical way. The lingering question is, however, how do they go about achieving this goal in a consistent manner?

One of the purposes of this study was to engage in a critical analysis of the museum education field using the case study method of descriptive research, to determine how actual programs were being designed and delivered. I also had the objective of synthesizing my findings against known learning theory to see if I could come up with a rational model for this setting.

Generally, my findings indicate that both types of museums actively write in their research that they consider the
developmental stage of the learner, either in terms of ability to comprehend the information, or in the way that the information is presented. Both types of museums consider motivation for attending the museum as a visitor, and consider their "behavior" once inside.

The science museum, however, regards behavior and attitude as important enough to include in their exhibit designs, or plans.

The science museum makes extensive use of prototyping and/or formative evaluation techniques to determine what interests visitors and employs the technique of direct observation of visitors as they move through the exhibit. Art museums in my sample do not. The science museum also reports the extensive use of the questionnaire or survey method of descriptive research to get the public's reaction.

The art museum appears to doggedly strive for cognitive outcomes (thinking, perceiving and problem solving) in their written objectives, using inductive inquiry agendas. There is, however, little evidence to show that this actually occurs for most people in the art setting. Art museums are known for, and have the greatest potential for, the aesthetic-response-result and several educators from my sample are attempting to expand on this known quantity.

Teaching in the art museum is usually performed in the "lecture" style by means of critical analysis, with a docent or guide. Visitor behavior in the art museum is not measured with the rigor that prevails in the science museum. At least one science museum educator called for the "aesthetic" outcome result in her
environment, so that visitors could be freer to discover broader concepts than those presented--leading to deductive strategies.

As a matter of approach to the job of educating, science museum educators reviewed from my sample of the literature (which spans several years and venues) have some notion about being able to "rigidly control the outcomes of their 'discovery' activities" (Chambers), in order to offer visitors an experience "carefully calculated to prove established facts or principles" in science. This "information-driven" approach appears to be the dominant, most consistent factor in the science museum, and consequently, the emphasis in this setting is on the effectiveness of the exhibit (rather than on the effectiveness of learning the phenomenon in question). This can be explained by the fact that since the science concept is a given, science museum curators apparently concentrate their energies on making that information clear via the exhibit. I think of the science museum as being similar to the role that an illustrated textbook plays in classroom instruction.

In the art museum, emphasis is on the "object" and only one educational researcher (in my sample) mentioned any consideration of the effectiveness of the "exhibit" as being a factor--Berleant, who called for object placement by theme or content. The Getty program that uses video disc technology for providing context to the study of Art is, in my view, a wholly dissimilar type of art museum experience, to the point that it makes the study of the "real" object secondary.
Most museum educators are, in fact, aware of the need to provide the visitor with an appropriate amount of context in order to heighten the opportunity for retention of information and provide for the use of concept-building techniques as a known educational factor. Many times however in this predominately visual environment, insufficient evidence or examples of a "concept" exist, and are not being effectively presented with the non-scholarly visitor in mind. This is noted by Tellier, Eisner/Dobbs as interpreted from their reports, is inferred from Berleant in the art museum environment, and acknowledged by most all researchers in the science museums, in my sample. There is also a misuse of text, and other sensory data is misapplied.

Conclusions.

A comparative analysis of the findings that were based on my six point guideline for critical analysis of the case study reports from science and art museums for learning (science, pp. 102-110; art, pp. 181-188) is as follows:

A. **General principles for designing instruction.** Science museums are aware of the need to introduce a novel event to get the visitor's attention. Art museum do not do this, probably because they don't see their programs as teaching—but as sharing information. Neither museum informs the learner about any educational outcomes. Art museums are aware that visitors will interpret information
based on prior experience, while science museums do not factor this because the learning of their content is not open for interpretation. Both museums appear to use advanced organizers, either intuitively or by design but only a few specify it in their reports. Both museums go from simple to complex in their presentation of material. Science museums rely on auditory and visual prompts and cues, art museums do not. Very few reports in my sample varied the information presented as a learning strategy, and both types of museums rely on examples of objects. One out of eighteen reports in my sample reported feedback to the visitor and all provide for practice and review—but it is rarely evaluated in an educational sense.

B. Methods for motivating students to learn. Both types of museums imply importance because of their settings or environment, and this might be best illustrated by the science type because one can see an exciting visual and participatory event that they read about in class, for example. In the science museum two reports stated the reasons for importance, none did in the art museum. The excitement of going to the museum is the external reward, but this is intrinsic and personal. One from each type of museum in my study specifically provided for success and accomplishment. The science museum combines attractiveness with subject matter and the art museum is intrinsically
"attractive" for the purpose of motivation and attitude development. I could not infer from the science museum study that they introduced non-case material, but one art museum report in my sample did. All of the cases were aware of the need to model interest and positive attitudes toward the subject matter, and the museum experience.

C. Methods for teaching specific cognitive skills.

1. Concept learning. Two science museum reports indicated that they presented definitions as a part of their concept building exercises, but I could not infer that the art component did so. Art museums do not often build concepts with unambiguous cases, and science museums do not often differentiate objects per se since they are intent on demonstrating phenomena. Only one report dealt with this issue of the non-case example explicitly out of the eighteen reviewed. One one report noted the use of case and non-case strategies, providing feedback on the exercise. There was no data that could be inferred on the need to provide feedback on the degree of discrimination as a strategy.

2. Principle learning. One science museum provided prerequisite concepts, and this could not be inferred in the art museum setting. Six reports total noted that they were of indicating a relationship between concepts. Two science reports indicated the need to have students
demonstrate the principles being presented, none did in the art setting. Two science reports noted the need to have students practice and receive feedback on demonstrating the principle, and there were none in the art setting although repeated utilization of the method of inquiry could be construed to constitute practice.

3. Problem solving. Neither setting seemed to be overtly concerned with the need to ensure learning had occurred on prerequisite concepts, also this would be implied in the art setting where clearly it is the situation where prior knowledge of art objects is desirable. All of the reports were presenting problems that they were trying to solve but only three in the art museum setting suggested that learners would be engaging in this process. Science museums stressed guidance and direction, and this was noted in four art settings. No art museum reports provided for feedback, and the science museums did so by means of interactive exhibits and in their own formative evaluation methodology.

D. Consideration of the typological information about the learner. As concerns information processing style, all science and art museums in my sample were clearly reporting on the use of inductive presentations. All reports were geared toward the primary use of visual perception, and only the science setting planned for the effective use of written
and auditory stimuli. The science environment noted the
effective use of multi-sensory stimuli. The science museum
considers the social needs for processing and designs it
into their exhibits, while none did in the art museum—which
is acknowledged to be a socially motivated experience. All
of the reports are aware of the need to move around or be
isolated while confronting the exhibit.

E. Employment of the critical phases in responding to art.

Four out of the nine science museum reports were aware of
the need to perceive subtle and obvious qualities by making
multisensory associations. All of the art museum reports
addressed this topic and were keenly aware of the inductive
approach. Speculating as a strategy for processing
information was emphasized in two science museum reports,
and didn't note any specific mention for the desirability of
building a vocabulary. None of the art museum reports
mentioned multisensory associations, two emphasized the
exploration of connotations, and four stressed the
importance of context. Concerning feeling and meaning,
eight of the nine art museum reports could be interpreted as
being aware of these perceptions. Only the diorama report
from the science component specifically addressed this
category.

F. Methods for criticizing art.

1. Inductive approach. Seventeen out of eighteen reports
either employed an inductive approach to their research or prescribed it for their museums. Four science and two art museum reports explained how to perceive the relationship between parts, although as previously noted they did not provide for practice or feedback in these areas, by my interpretation. Two science and three art reports noted how their exhibits were designed to relate to the prior experience of the visitor or that prior experience would be a factor, albeit as noted they did not rely on prior experience to impart their messages. Only one report out of eighteen (art) emphasized the importance of inductively coming to an awareness of recurrent themes, qualities and ideas, or that the visitor is made aware of themes from one exhibit to another as a design feature. Recurrent themes are passively stated, or seem obvious?

2. Deductive approach. All reports show evidence that all four criteria (inductive, deductive, empathic and interactive) could be employed. Two art museum reports specifically called for an examination of the work to identify evidence that specific features do not meet the criteria.

3. Empathic approach. All museums are aware of noting the obvious aspects of subject matter, and all are visually oriented. Only two out of eighteen reports noted the
use of analogies and metaphors to engage the attention of the visitor for what is seen and felt. Thirteen reports acknowledge that the visitor's prior experience will affect the way that the information is interpreted. My study shows that nine science museum reports encourage the physical and imaginative involvement of the visitor, but only three art museum samples do. Two science and two art museum reports note judging as a part of their strategy for learning.

4. Interactive approach. I would suggest that each venue assigns the task of moderator to the museum educator, and that this is accomplished by personal intercession by the use of educational technology and planning. One example from the science and one from the art museum suggested that the parent is the moderator—although the question of being able to direct learning is not defined. The art museum calls for drawing people into the process of describing and interpreting information, and only one hypothetical example of this came to light from the science setting. Moving to group discussions for the building of hypotheses was noted in the science museum as a part of the evaluation process, and was noted as a strategy for the art museum (which would work with a group or class of students).
Recommendations for further research.

Based on the case study reports presented in this paper, and on the synthesis of my findings based on the criteria I developed for learning in a visual environment, I can make the following recommendations for the general museum environment, and specifically applicable to the art museum setting. Those are:

1. There is a need for an ongoing synthesis of empirical research from all kinds of museums at the national level, in some "clearing house" fashion, by an accrediting body made up of member museums (the AAM has this potential but does not seem to be effective, at this time). This would serve the purpose of coming to grips with the fact that Museums can be valid educational institutions, and as such need to have a standards and practices-type policy for the delivery of services.

2. There is some need to begin to prescribe a minimum standard for a course of study for museum educators, and with that the development of a national course of study that can be recognized across the museum profession for those wishing to enter the field. This would standardize curriculum and allow more people to enter this job market. It would also create a program standard that the public could rely on for the delivery of educational services--similar to the rational for testing and certification in the schools. This would also serve the purpose of facilitating the use of public funds for museum education programming.
3. In terms of content, Science and Art Museums should open doors to work more cooperatively on a "full" interpretation of their collections. What is the historical significance, or what is the aesthetic? This would have the effect of making full use of the collection's potential, and in the long run should provide for broader research.

4. Museums need to look to trained educational researchers for evaluation studies of their programs, and for the intermediate purpose of instructing educators about relevant theory that can be applied to their thinking. Later, this could be a specialty area for the museum (it does exist in some museums at this time). The evaluation that currently exists is mostly interpreted in terms of marketing potential and not education.

5. Finally, Museums need to be thought of as research laboratories in order to reach their fullest educational potential. That purpose needs to be stressed to the public, and to the museum curator/educator and staff so that they can begin to make their information more intellectually and physically available.

A model for art museum learning?

In the general statement of the problem I indicated that the museum literature suggests that there is no free-standing museum education discipline, and I observe by this that there is also no
set of principles that have been developed and codified for general dissemination to the public and fellow professionals, which might form a basis for the delivery of educational programming that leads to "learning" in the museum environment.

Concerning science museums, they report enjoying a tremendous amount of visitor support and are heavily attended by school groups during the year. A local science and industry museum, COSI, for example, states in their promotional literature that over 700,000 paying adults and children annually visit their facility.

The reports cited in my study indicate that those attending science museums do so in groups of two or more, and observational research performed on visitors shows that these groups actively engage the science exhibit, with both parents and children interacting either physically (pulling levers, pushing buttons, working computers and playing), or verbally by "teaching" each other.

Since we know that one way for people to learn is by actively processing "information" from the environment, making the art museum a more "active" and participatory setting in the broad sense would be a positive step. Key characteristics to keep in mind are that people (all age and developmental levels) initiate experiences that lead to learning, seek out information to solve problems and reorganize what they already know to achieve new learning. People actively choose, practice, pay attention, ignore, and make many other response in this pursuit.
As noted at the beginning of this paper, concerning the processing of visual information, S. Bartley (1980, p. 346), defines "perceptual learning" as "any relatively permanent and consistent change in the perception of a stimulus array," following, he writes, "practice or experience with this array." Bartley points out that his definition (from E. Gibson) emphasizes two things: the practice, and the relative permanence of the result. And, this is precisely what my analysis of the museum education setting revealed to be missing from the programming for learning.

Although many people who have an extensive background in the visual arts find the art museum to be an extremely "active" stimulus environment, those who don't have that background are clearly going to fail in their attempt be able to get any sort of meaning from the art object—as least in terms of meaningful learning, in my view. This is similar to a situation where a book becomes useless if the person cannot read.

In my view, providing active and participatory opportunities in the art museum can be accomplished without changing the existing object-centered emphasis (since it is the individual "object" or artifact that functions as the primary source of information, or the primary "concept"). What would happen in fact would be the expansion of the notion that art objects deserve to be studied as subject matter.

One sure benefit of looking to the art museum "exhibit" for educational potential (note that I am advocating the value of the
exhibit even while emphasizing the importance of the object) will be its potential for survey and observational research—such as is found in the science venue. The objective in doing this would initially be to provide for the kind of prototyping research that appears to be so productive in the shaping of "attitudes" affecting visitor behavior in the science museum.

And collaterally, adding educational structure to the art museum exhibit would also allow the museum educator to begin to plan for outcomes (whether affective, intellectual or cognitive). Planning for outcomes would also facilitate the educator being able to test, as desired, whether visitors have actually been able to "learn" or access information, where such outcomes are desirable. In my opinion, this benefit has been here-to-for unavailable because of visitor naivity concerning art works, social expectation (seeing the art museum as a social experience rather than an educational one), lack of motivation to learn, or inability to decode the symbolic information in an art object (without some level of competence in art history), such as predominates this type of museum environment (i.e. in the science museum one can at least have "fun," but in the art museum I suspect "fun" takes on a different meaning for the average visitor).

Generally, the art museum needs to not only "demyisitize" the visitor, as my study findings suggest, but needs to take the same approach with the art objects. In my view, objects that have been selected for exhibit in the art museum are still not considered as
intellectually approachable by the general public in the same way that scientific phenomena are in the science museum. Few people come out of the science museum saying that "my child could have invented the light bulb," but are more than apt to state with great conviction that their offspring could have created a Jackson Pollack painting, or an abstract Picasso.

As Screven (1986) pointed out in his article on the principles and approaches to exhibitions and information centers, museum audiences learn by "paying attention to exhibit content, noticing details, making comparisons, reading explanatory text, or following instructions." He also commented on the fact that museum audiences vary in age, education, interests, attitudes, preconceptions, and have a variety of skills, knowledge and motivations. Some visitors wander "aimlessly" through the museum, while some are "scholars, hobbyists and students" who have specific interests and goals.

**A yardstick for measurement, and a plan for execution.**

Based on my synthesis of the science and art museum education reports in my study, I can infer the following yardstick for use in the art museum:

1. The concept for an exhibit design focuses on an art object, such as a painting for its primary source of information. The educational technology used to engage the learner would be the interactive features that the science museums find to be so successful, and emphasizes
some of the newer technology, such as noted by Levy (1990) in my report on the Getty's research with the video disc and computer for interactive question and answer, guided discovery, and context potential. This technology provides for self-paced activity, practice, and positive reinforcement.

I suggest that the object can be specifically accompanied by a dedicated computer and video disc setup, and the equipment necessary to produce a facsimile of the artifact (i.e. an image of the painting on the screen), or even a three dimensional "hologram" of the object if it is a sculpture, so that the object being studied can be rotated.

2. One of the ways that art educators teach people about art is to let them engage in a studio activity. This may not be possible or altogether desirable in the museum setting and so the computer and video disc technology is used to simulate a situation where one could actually create or reproduce the art object in the manner of the artist who did the original work.

This provides for what Efland (1987) cited as the "mimetic" tradition in art education, and gives the visitor a kind of first-hand or experiential approach to an unknown. The computer/video disc can be programmed to offer an interactive
experience, such as by asking (and directing the user to engage in the activity) how did the artist lay in the background? What were the color choices, or what was the palette—as we say? How did the artist mix the paint to arrive at that value and why (this could be pre-programmed and could lead in a variety of directions, such as adding an explanation of color theory)?

These are factors that can be simulated by the computer, similar in complexity to what Levy (1990) suggested that the Getty is already doing with multiple sources (text, pictures, sound, etc.).

This kind of simulation has the educational effect of providing young learners with an opportunity to assimilate new information for the building of schemata, and could have the collateral effect of modifying old, existing information that learners may have acquired about making art in school.

3. As a subset of engaging in the studio activity, the learner might want to investigate some of the compositional aspects that come into play. How would the Mondrian or the Picasso "work" if some of the surfaces or lines were changed. These could either be prompted by the computer, or performed on a "discovery" basis. Educationally this affords the art
museum learner the opportunity to engage in a problem solving activity.

4. For the non-artist who is a scholar, verbal or written information would be available on the computer disc, offering context for research. The visitor could call on information to learn more about a style, and could inquire about the other factors that influenced the period, such as economic and political forces. What music was being written during the time of the Impressionists? How did the invention of the light bulb effect the invention of the motion picture camera?

5. For art researchers, other art works from other artists could be compared using the hologram technique for projecting an image, or by using an on-screen image. The educational objective of comparing and contrasting would provide for an on the spot comparison of one work to another. Other paintings from the same school could be visually overlayed with the original on the wall (like putting one slide over another) to check for details (case and non-case examples).

This would amount to doing original research, rather than comparing reproductions. These techniques would also be a great boon to teaching because the computer could simulate
an artist's style, technique and method in a manner that has heretofore been impossible to duplicate.

6. And, for those who wanted to immerse themselves into the quiet contemplation of a purely aesthetic relationship with the art object, they could do so without any interference because the didactic aspects of the exhibit can also become as passive as they are active.

Art Museum Learning Goals.

These suggestions might accomplish the following:

1. Emphasize the exhibit as a focus in the Art Museum, where educational strategies can be employed similar to those noted in my study from Science Museums. These would include advanced or pre-organizers specifically dedicated to one exhibit (eliminating the need to absorb a great quantity of generalized information), and based on object content which can be structured to lead to affective, intellectual, or cognitive outcome.

2. Emphasizing the exhibit (where the "exhibit" is defined as consisting of one object or several) would permit educators, exhibit designers and researchers to be able to work together to conduct studies into behavior, motivation, and aesthetics (which already exists but is not measured, i.e. one could begin to survey opinion about "feelings").

3. The use of formative and summative evaluation techniques
could be employed in the art museum, and would begin to assist the curator and/or educator in exhibit preparation and areas for concentration similar to what my study noted in the science museum. Being able to determine what and why the public liked the Rembrandt exhibit is far more useful than just knowing how many people attended.

4. Employing techniques to emphasize the self-motivated inquiry could be used to enhance outreach potential because structured educational packages could be designed and made more available as self-contained units—yet still realizing the museum's objective of getting a "real" object into the "hands" of more people.

The development of a model or paradigm for "learning" in the art museum is, in my view, accomplished by creating an environment that is similar to that found in the classroom, by providing for "teacher" interventions, to direct, reinforce and encourage practice with the material. This can be accomplished by using a human being, or a computer—such as is the case in many current settings.

In my opinion, art and art objects are not only subjects worth studying in the same detail as math or geography, but in our ever increasing visual environment using media, are key components in a well rounded education. Art can be understood at a variety of levels, as witnessed by the growing popularity of the current Getty
DRAE model of study in aesthetics, criticism, history and studio being adopted by public school art education programs and museums across the country.

I firmly believe that art museums are currently being underutilized as learning environments, and that art museum educators can construct truly educational opportunities for visitors following the learning guidelines that I have set forth in this paper.
BIBLIOGRAPHY


