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ABSTRACT

A status report on museums and media prefaces the annotated references listed in this paper. Futuristic proposals have been made for a Museum of Media that would be all media and no objects, and for a museum environment individualized by computer and visual previews of the galleries. The museums of today use films, slide-tapes, sound recordings, and electronic guide systems. Plans are being made for a Museum Computer Network. The important role that museums play in elementary and secondary education is represented in the references to books, papers, periodicals, and reports. (MF)

MUSEUMS AND MEDIA: A BASIC REFERENCE SHELF

By Philip C. Ritterbush
Smithsonian Institution

With MUSEUMS AND MEDIA: A STATUS REPORT

By Richard Grove
The Arts in Education Program
The JDR 3rd Fund

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MUSEUMS AND MEDIA: A STATUS REPORT*

By Richard Grove

. . . Museums today see themselves as having had thrust upon them an aggressive educational role, linked to the social and economic problems of the times. They must define their educational powers and somehow develop a formidable range of abilities. Without losing unity, they must see that scholarly work is not stinted, that the essentially nonverbal nature of the visual arts is not betrayed, that the connoisseur may confront works of art in something approaching "perfect contemplation," and that the bewildered, turned-off, trapped ghetto child may be reached and helped.

Do museums of science, history, and art have special ways to contribute toward solutions of contemporary social and economic problems? To the extent that a museum takes this question seriously, it will be reexamining its function, the characteristics of its audience, and the relevance of traditional museum educational methods. And to that same degree it will be looking to current technological developments for assistance.

Two factors help account for the fact that the museum world greeted the advent of the age of media with something less than passionate acceptance. The first of these is that the museum field is extremely weak in research and development. The second is a frame of mind. Museums are first and foremost places of the unique, the original object. All reproduction is counterfeit, translation into something inauthentic, a swindle for the unsuspecting. Museums, in this view, must hold to their essential purpose with renewed tenacity in a time when people are assailed, violated, saturated with the second-hand reality of the media, the air is full of language, and the impact of the object grows in power and consequence. "Electronic communication," says the Winterthur Museum's Craig Gilborn, "is, after all, every bit as artificial or vicarious as the printed word."

> Rather than liberate, it may yet further serve to restrict and banalize experience . . . Providing first-hand, exploratory experiences for the individual, not just in the classroom but in the larger world as well, is the only way, in the end, of reaching society itself.[1]

At the other theoretical extreme, a recently published brochure announces a proposed "Museum of the Media" in New York City which will be all media and no objects. (The distinction between "realities" becomes blurred as technological media become art media, directly employed by the artist. One can imagine a future art museum entirely devoted to the work of such artists. The "art object" no longer exists. A significant organization working in this field is Experiments in Art and Technology, Inc. (EAT), 235 Park Avenue South, New York, N.Y. 10003.)

The Museum of the Media will, the announcement sturdily claims, "inaugurate a sweeping change in the form of museums as we know them today."

> The primary function of the traditional museum has been to house and preserve collections of art objects. In this role, the museum has necessarily been confined to rich urban centers.
>
> The exhibits of the Museum of the Media, however, consist of audio tapes, movies, slides and programs. They can therefore . . . be easily and inexpensively duplicated.
>
> The Museum can thus readily make exhibits available to autonomous museums in small towns, suburban communities and ghetto areas which will thus be able for the first time to achieve a cultural parity with the central cities.[2]

Be all that as it may, the use of media to allow the museum to reach out beyond its walls is of interest here.

. . . Museums of all types use film as an educational instrument and present it as an art form. (The Museum of Modern Art's film library is one of the most important in the world.) Of 2,752 institutions responding to a 1964 questionnaire, 644 reported that they program film showings.[3] Slide-tapes are frequently used as an introduction or adjunct to special exhibitions. Sound recording is widely employed. One familiar device has a funnel-like earpiece attached to flexible tubing. Pluck it from its resting place and it speaks to you. Electronic guide systems are commonplace, usually supplying the visitor with either individually operated little tape recorder playback units, or portable radio receivers, similarly furnished with headphones, which pick up a continuous program emanating from a small broadcasting station. The latter equipment accounts for a curious museum

*This status report is based on a paper prepared for the President's Commission on Instructional Technology in 1968. Richard Grove is now at the Smithsonian Institution.

phenomenon: blank-faced, hypnotized-looking people, sprouting antennae and shuffling from gallery to gallery in groups, heads swiveling in unison, rather like schools of fish.

. . . Many audio-visual devices which are satisfactory in classroom use are ill-suited to continuous, daily museum use. Too, most museums cannot afford to have an audio-visual technician on the staff to attend to the machines.

The facilities and staff required for regular television programing limits it to larger museums. The Museum of Fine Arts in Boston has probably made as great a use of television as any other museum. The museum's Television Supervisor, Patricia Barnard, says that

> Twelve years ago the Boston Museum of Fine Arts decided to make a major commitment to television as an extension of its educational services. Since then we have produced some 1,000 programs—creative art courses for adults; programs for children; the popular IMAGES series, which weaves together photographs of works of art, background narrative, and music, with an end result similar to a motion picture film; and the unique weekly series, currently called MUSEUM OPEN HOUSE, which is produced in the Museum's galleries using our greatest treasures in the original. The Boston Museum was the first and is still the only major art museum completely wired for television.

Museum-produced television programs by no means exhaust the possibilities. Other kinds of uses will undoubtedly be developed as museums explore the use of television in new varieties of multi-media exhibitions.

. . . To the best of my knowledge, no one has yet used television and video tape in training teachers and docents, training museum workers (conservators might borrow from some of the television techniques developed for observing surgical operations), or to permit children to make their own taped museum programs for a school audience.

The computer has a great number of possible museum applications. More than one may turn out to have a revolutionary effect. Some uses have already been made; others are as yet only proposals.

It is apparent that if information about collections in one museum may be computerized, then information about the collections of several museums may be pooled. The way is then open for a national file: a research instrument and an educational resource of enormous depth and richness.

. . . A group of fifteen museums in New York City and the National Gallery of Art in Washington announced in December, 1967 that they have established a project called the Museum Computer Network with an office at the Museum of Modern Art.[4] Everett Ellin, former assistant director of the Solomon R. Guggenheim Museum, is the executive director.

> This project will be a super-dossier on art, a vast continuous art book," says Ellin . . . "It will be an in-depth archive that goes beyond a listing and cross-indexing of titles, artists, descriptions, provenances and bibliographic references—even the images of the works will eventually be included in the data."
>
> "All a teacher lecturing on Greek sculpture would have to do is to go to a console, dial a code number and have pictures and an arsenal of information about Greek sculpture available the instant it's needed.[5]

The Museum Computer Network plans to file data from northeastern museums and then proceed to set up a system of terminals in museums, libraries, and other educational institutions. Ties might be made with European museums. Ellin visualizes a new order of "museum without walls":

> Ellin sees computers bringing art directly into the homes of the future. "With computerized programs we could call up what we wanted. Every man could become a curator and orchestrate his own exhibitions. The result would be a restoration of the personal eye.[6]

In April, 1969, the Metropolitan Museum of Art, with the aid of a grant from the IBM Corporation, sponsored "A Conference on Computers and Their Potential Applications in Museums."[7]

In a paper presented at the conference, Robert S. Lee, of the IBM Corporation, described a feasible but as yet imaginary "individualized museum environment."

. . . with the computer, the entire museum visit as a total learning experience can be radically transformed.

Let us consider, for example, a visit to the art museum of the future. The entrance hall, as is often the case today, might be devoted to setting the mood and orienting the visitor to the diverse possibilities open to him during his stay at the museum. On a high wall at the rear of the room, the visitor would see an everchanging kaleidoscope of projected pictures—these would be of paintings, sculpture and other art objects currently on exhibit throughout the museum. A closer examination of the hall would show that these changing pictures are generated as a result of various choices that visitors make at a number of individual exhibit stations placed throughout the hall. These are special stations where the incoming visitor can make inquiries and get a preview of what is on display in the museum galleries. He could, for example, touch a particular gallery on a map of the museum to call forth a series of slides and commentaries on what he might see there. He would also provide information on his background and his interests, and would give his personal reactions to pictures of various art objects . . .

At the end of the inquiry session, on the basis of the profile developed on him, the visitor would get a personally tailored set of suggestions as to how he might most benefit from and enjoy his visit to the museum that day. In addition, the visitor would get an individually unique "key card" which he can use to start any of the interaction exhibits that augment the art objects on display in the specialized museum galleries. By means of this key card, the visitor's information profile would be available to all of the computerized exhibits throughout the museum. Each of these gallery exhibits will then be able to tailor its content and its style of presentation to suit the needs, wishes, background and even the personality of the individual visitor. Not only will the connoisseur be treated differently from the novice, but each connoisseur and each novice will be treated differently from each other one.

By exploiting the adaptive capabilities of the computer, the museum of the future can become a place where every visitor, in a very real sense, creates his own learning environment.[8]

Quite evidently, the impact of the computer on the world of museums is going to be considerable.

An experimental laboratory, headed by museum professionals with the aid of a multi-disciplinary staff, could, at this point in time, help greatly in developing new uses of technology in museums and in increasing the museum's educational flexibility, scope, and power.

REFERENCES

1. "Words and Machines: The Denial of Experience," *Museum News,* Vol. 47, No. 1, September, 1968.

2. "Museum of the Media," brochure, New York, 1968. An article on the Museum of the Media is "Modules for the Millions," by Grace Glueck in the *New York Times,* June 22, 1969.

3. *A Statistical Survey of Museums in the United States and Canada,* American Association of Museums, 1965.

4. Harry Gilroy, "16 Museums to Study Computer Archive of Art," *New York Times,* December 9, 1967.

5. "The Electronic Museum," *Newsweek,* December 25, 1967, p. 42.

6. *Ibid.*

7. *Computers and Their Potential Applications in Museums,* New York: The Metropolitan Museum of Art, 1968.

8. Robert S. Lee, "The Future of the Museum as a Learning Environment," in *Computers and Their Potential Applications in Museums,* New York: The Metropolitan Museum of Art, 1968, pp. 383-384.

MUSEUMS AND MEDIA: A BASIC REFERENCE SHELF

By Philip C. Ritterbush

INTRODUCTION

The books, papers, periodicals, and reports listed here help to show that museums play an important role in elementary and secondary education. The list is intended to serve general interests both in schools and museums. It is to be hoped that designers of public programs will bear in mind the contribution which can be made to education through expanded support to museums and other community educational resources. Perhaps the museum profession will widen its interest in education, for exciting new understandings of visual learning by children are applicable to museum exhibits generally and may also lead to a new recognition of the extent to which museums and schools may benefit from cooperative activities.

I am grateful to Miss Katherine Goldman, Coordinator of Studies in Museum Education at the Smithsonian, for her assistance with this bibliography. It is not intended to be exhaustive. A number of bibliographies and references with bibliographies are cited which may lead the interested reader further.

This seems an appropriate place to mention that the Smithsonian Institution is endeavoring to create a museum study center as a headquarters for visiting investigators from museums and educational institutions, and that contributions of books, reprints and periodicals—as well as project support—will be appreciated.

I. REFERENCES PRIMARILY FOR EDUCATORS

A. General References on Museums

Curator, a quarterly publication of the American Museum of Natural History, subscription $7.50 per year ($8 in Canada and all foreign countries). Address: Central Park West at 79th Street, New York, N.Y. 10024.

Eric Larrabee, ed., *Museums and Education,* Washington: Smithsonian Institution Press, 1968, 262 pp., $6.50.

Includes papers on museum education by Edgar P. Richardson, Henry Allen Moe, Joseph A. Patterson, Bartlett Hayes, Jr., Richard Grove, Ruth Zuelke, Alma Wittlin, Scarvia B. Anderson, Helmuth Naumer, Sue Thurman, James Heslin, Frank Oppenheimer, Michael Butler, and Stephen White which originally were presented at a conference supported by the U.S. Office of Education in 1966 under the sponsorship of the Smithsonian. The anthology and the summary by Eric Larrabee demonstrate the difficulty of coming to grips with specific educational needs through the medium of the museum, revealing the inherent complexity of the subject and the remoteness from the formal school system of direct visual learning. The unedited papers are available through the ERIC Document Reproduction Service, in microfiche for $1, in hardcopy for $11.10, as document ED 014 814.

Eleanor M. Moore, *Youth in Museums,* University of Pennsylvania Press, 3933 Walnut St., Philadelphia 10104, 1941, 115 pp.

An excellent survey of museum education activities based on visits to more than one hundred museums. May still be read with profit as an introduction to museum education. (This document is now out of print, but is available in some libraries.)

Museums Directory of the United States and Canada, 2nd ed., Washington: American Association of Museums and Smithsonian Institution, 1965, 1039 pp., $7.50.

This is the principal reference work on museums in the U.S. and Canada. A geographic directory is followed by an alphabetical listing for the 4,956 museums and related institutions covered. The third part lists directors and department heads. The fourth part lists museums by categories. In education the following topics are included in the index: Formally organized programs for adults and for children, programs at graduate and undergraduate levels, expeditions, experimental studies in science, extension courses, field work, films, hobby workshops, joint university programs, junior clubs, libraries, loans, pageants, research summer programs, television, workshops, and others. A third edition was due to be issued late in 1970.

Museum News. A monthly magazine devoted to reports on museum programs, association affairs, and articles by leading members of the museum profession. Subscriptions: Individual $15, library (not museum library) $25, institutional $30 up. Additional copies available at $1 each from American Association of Museums, 2306 Massachusetts Avenue, N.W., Washington, D.C. 20007.

Grace Fisher Ramsey, *Educational Work in Museums of the United States; Development, Methods and Trends,* H. W. Wilson Co., 950 University Ave., Bronx, N.Y. 10452, 1938, 289 pp.

A survey of the character of museum education activities, including a history of evaluation experiments.

S. Dillon Ripley, "Museums and Education," *Curator,* Vol. 11, No. 3 (1968).

A reaffirmation of the museum's commitment to educational programs by the secretary of the Smithsonian Institution.

S. Dillon Ripley, *The Sacred Grove; Essays on Museums,* Simon and Schuster, 1969, 159 pp., $5.

A deft interweaving of educational and cultural elements in museum programs.

Charles Russell, *Museums and Our Children; A Handbook and Guide for Teachers in Museums and Schools and for All Who are Interested in Programs of Activity for Children,* Central Book Co., 850 DeKalb Ave., Brooklyn, N.Y. 11221, 1956, 338 pp.

The author's experience as chairman of the Department of Education of the American Museum of Natural History helps to make this an excellent practical guide, filled with examples drawn from the programs of many museums.

James B. Taylor, "Science on Display: A Study of the United States Science Exhibit, Seattle World's Fair, 1962," University of Washington, Institute for Sociological Research, March, 1963, 193 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 75c, in hardcopy for $9.75. Ask ERIC at Stanford for the document number to use in ordering.)

The leading study of visitor learning in an exhibition, it pioneered in methodology as well as reached some important conclusions about attitude change and information retention. Sixteen appendices also are available from the Institute for Sociological Research.

Lola Erikson Rogers, *Museums and Related Institutions: A Basic Program Survey,* Government Printing Office, 1969, 120 pp., $1.25.

Based upon a pioneering survey of 2,889 establishments considered to conform to a working definition of museum, this study was undertaken for the U.S. Office of Education in cooperation with the Smithsonian Institution and the American Association of Museums. It provides important overall information on governing authority, type of exhibits, location by city and state, paid and volunteer staff, study facilities, level of operating expenditure, number of annual visits, and educational services.

Alma Wittlin, *The Museum: Its History and its Tasks in Education,* Routledge and Kogan Paul, Ltd., 68 Carter Lane, London E.C.4, 1949, 297 pp.

Long the best known and still the standard work on museums and their educational role. (This document is now out of print, but is available in some libraries.)

Hans L. Zetterberg, *Museums and Adult Education,* Evelyn, Adams & Mackay, Ltd., 9 Fitzroy Square, London W.1, for the International Council of Museums, 1968, 100 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 50c, in hardcopy for $5.10. Ask ERIC at Stanford for the document number to use in ordering.)

A comprehensive recent discussion of the role of museums in adult education.

The reference shelf also should include leaflets, program descriptions, and annual reports from nearby museums.

B. References on Educational Activities of Museums

Annual Directory of Behavior and Environmental Design, for 1969, REDE; Research and Design Institute, 210 pp., $3 from REDE, P.O. Box 307, Providence, R.I. 02901.

This occasional directory is one of the best sources for information about visual communication in learning environments.

Stephan F. De Borhegyi, "Visual Communication in the Science Museum," *Curator,* Vol. 6, No. 1 (1963), pp. 45-57.

Discusses the programming of visual communication, with reference to convincing and effective exhibits on anthropology. Stresses the importance of sound, touch, and spatial setting. Borhegyi's death cost museum education its foremost leader. The water pollution exhibit displayed on page 55 of the journal is an example of how far ahead of the field he usually was.

G. Ellis Burcaw, "Films for Teaching Museology; a Guide to Where They Are," *Museum News,* Vol. 46, No. 3 (Nov., 1967), pp. 25-26.

Describes a variety of films on museum exhibitions.

Duncan F. Cameron, "A Viewpoint: The Museum as a Communications System and Implications for Museum Education," *Curator,* Vol. 11, No. 1 (Dec.,1968), pp. 33-40.

In this important article the author defines those communications processes for which exhibits may be the medium of choice and concludes that education in museums should concentrate on the acquisition of visual learning skills in a manner akin to learning a language.

Germaine Cart, Molly Harrison, Charles Russell, and Peter Floud, *Museums and Young People,* Paris: International Council of Museums (ICOM), Maison de l'UNESCO, 6 Rue Franklin, Paris 16e, 1952, 131 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971. Ask ERIC at Stanford for the document number to use in ordering.)

The thoughtful introduction by Peter Floud exposes several recurring misconceptions about museum programs for children, based on his experience at the Victoria and Albert Museum.

Emily Dennis, "Grant Material: A Museum Program in Anthropology and Archaeology for High School Students," *Museum News,* Vol. 45 (Feb., 1967), pp. 16-17.

Describes direct student participation in the study of field sites near the Brooklyn Children's Museum, with support from the National Science Foundation. Of forty-three respondents from among 160 participants over four years, twenty-five were majoring in or planning to major in anthropology.

Richard Ellis, "Museum Exhibits in Zoos and Aquariums," *Curator*, Vol. 10, No. 4, 1967.

Describes mostly pictorial exhibits of written matter designed and installed to supplement live collections, to make zoos and aquaria better serve functions as "educational institutions." Article contains good photographs of exhibits.

Clark C. Evernham, "Science Education: A Museum Responsibility," *Museum News*, Vol. 40, No. 2 (Oct., 1961), pp. 20-22.

A lucid discussion of the role of the educational staff in museums coupled with a plea for new ways to train educators for museums—something the Smithsonian is trying to develop with a museum education course.

Edwin N. Ferdon, Jr. and Emma M. Cappelluzo, "A Double Duty Docent Program," *Museum News*, Vol. 44, No. 7 (March, 1966), pp. 20-24.

Describes the use of college students to conduct school tours at the Arizona State Museum.

Theodore L. Low, "The Museum as a Social Instrument" (A Study Undertaken for the Committee on Education of the American Association of Museums), Metropolitan Museum of Art, New York, 1942, 70 pp. (This document is now out of print, but is available in some libraries.)

This important paper by an able advocate of popular adult education describes the institutional changes needed to establish educational capacity in museums. His arguments against prevailing conventions in school tours and exhibit technique may still be read with profit.

Dorothy A. Mariner, *The Museum: A Social Context for Art*, University of Rochester, June, 1969. 384 pp. Available from ERIC Document Reproduction Service, in microfiche for $1.50, in hardcopy for $10.60, as document ED 033 141.

A study of the Memorial Art Gallery of the University of Rochester and its relations with the community, in the context of an inquiry into the theory of popular culture.

Gilbert E. Merrill, "New Dimensions in Museum Teaching," *Museum News*, Vol. 46, No. 2 (Oct., 1967), pp. 35-37.

A thoughtful summary of educational activities within the museum, based on the author's experience as chairman of the education department of the Academy of Natural Sciences of Philadelphia.

Arminta Neal, *Help! For the Small Museum; Handbook of Exhibit Ideas and Methods*, 2nd ed., 1969, 200 pp. Available from Pruett Press, Box 1560, Boulder, Colo. 80302, for $7.50.

The author is curator of the department of graphic design, Denver Museum of Natural History. A practical handbook on principles of display, treatment in cases and other settings, and notes on construction.

"The Museum Community; New Roles and Possibilities for Art Education," Institute for the Study of Art in Education, 41 pp.

This report of a conference held at the Metropolitan Museum of Art, prepared by Richard Grove, is available at the Institute at New York University, 80 Washington Square East, New York, N.Y. 10003. It includes an excellent description of the programs of the Brooklyn Museum by its director, Thomas Buechner, and introductory remarks by Thomas Hoving, Director of the Metropolitan Museum.

Elizabeth H. Nicol, *The Development of Validated Museum Exhibits*, Report to the Bureau of Research, U.S. Office of Education, The Children's Museum, Boston, 1969, 108 pp. Available from ERIC Document Reproduction Service, in microfiche for 50c, in hardcopy for $5.50, as document ED 035 038.

A highly competent discussion of the museum as a learning environment, this report presents a case history of the development of an exhibit on animal teeth in which experiments on learning effects were applied to the design of the final installation. This is an important document in the meager literature of exhibits evaluation.

A. E. Parr, "Some Basic Problems of Visual Education by Means of Exhibits," *Curator*, Vol. 5, No. 1 (1962), pp. 36-44.

An earnest effort to appraise the educational effects of exhibits, including an argument in favor of measuring such effects, not simply of "the absorption of knowledge" (which may be easy to quantify) but "the achievement of understanding," which is an important distinction. Dr. Parr is the author of many other excellent articles.

Irving G. Reimann, "The Role of a University Museum in the Education of Students and the Public," *Museum News,* Vol. 46, No. 3 (Nov., 1967), pp. 36-39.

An excellent description of the museum of the University of Michigan and its role as a resource in the community of Ann Arbor.

C. G. Screven, "The Museum as a Responsive Learning Environment," *Museum News,* Vol. 47, No. 10 (June, 1969), pp. 7-10.

Explores some psychological aspects of museums, obstacles in their communications processes, and possibilities for improvement derived from research in learning.

"Museums and Education," special issue of *Museum,* Vol. 1, Nos. 3-4 (1948), UNESCO Publication no. 244. (This document, it is hoped, will be available from the ERIC Document Reproduction Service by May 1971. Ask ERIC at Stanford for how to order.)

Eighteen articles, including some very interesting discussions of visual presentation techniques.

Miriam Wood, "A Museum's Contribution to Curriculum," *Museum News,* Vol. 45, No. 6 (Feb., 1967), pp. 36-37.

Describes school programs at the Field Museum of Natural History. (This issue also contains an article on the role of Chicago museums by the Associate Superintendent of Schools for Curriculum Development.)

C. Items Potentially Applicable to Museums

1. Educational Research in Museums

David Abbey, "Kids, Kulture, and Curiosity," *Museum News,* Vol. 46, No. 7 (March, 1968), pp. 30-33.

Describes the museum as a communications system and refers to recent research on the psychology of perception.

Marguerite Bloomberg, *An Experiment in Museum Instruction,* American Association of Museums, N.S. No. 8 (1929), 39 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 25c, in hardcopy for $2.05. Ask ERIC at Stanford for the document number to use in ordering.)

A comparison of the educational effectiveness of a variety of learning strategies in the Cleveland Museum of Art for groups of students ranked by their schools into different ability groups.

Stephan F. De Borhegyi and Irene A. Hanson, "Chronological Bibliography of Museum Visitor Surveys," in Eric Larrabee, ed., *Museums and Education.* Washington: Smithsonian Institution Press, 1968, pp. 239-251.

A remarkable and very worthwhile historical checklist of about 150 surveys. An earlier version, with a few titles not repeated in 1968, is "Chronological Bibliography of Museum Visitor Surveys," *Museum News,* Vol. 42 (Feb., 1964), pp. 39-41.

Duncan F. Cameron, "How Do We Know What Our Visitors Think?" *Museum News,* Vol. 45, No. 7 (March, 1967), pp. 31-33.

Knowledgeable advice about studies of visitors which may be conducted even by small museums, and criticisms of careless data-gathering programs not readily translatable into improvements in visitor services.

Arthur W. Melton, Nita Goldberg Feldman and Charles W. Mason, "Experimental Studies of the Education of Children in a Museum of Science," in Edward S. Robinson, ed., *Studies in Museum Education,* Washington, D.C.: American Association of Museums, 2306 Massachusetts Ave., N.W. 20008, N.S. No. 15, 1936, 111 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 50c, in hardcopy for $5.90. Ask ERIC at Stanford for the document number to use in ordering.)

Summarizes studies of learning conducted among children visiting the Buffalo Museum of Science, including evaluations of advance preparation, illustrated lectures, and methods of instruction. Among the more interesting findings was that children's retention of information was not significantly improved if lectures at the museum preceded visits to the halls. It may be that the study overemphasized information retention.

Mildred C.B. Porter, *Behavior of the Average Visitor in the Peabody Museum of Natural History, Yale University,* American Associations of Museums, N.S. No. 16, 1938, 32 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 25c, in hardcopy for $1.70. Ask ERIC at Stanford for the document number to use in ordering.)

Two years' analysis of Sunday afternoon visitors showed that they followed a course leading from man through lower animals instead of the reverse, as the guidebook recommended; that interest gradually declined throughout the visits except where the means of display were varied; that only four of the shortest labels were read by over half of the visitors, and that the average visitor stayed in the museum 22 minutes. An experiment with printed hall guides is reported.

Edward Stevens Robinson, *The Behavior of the Museum Visitor,* American Association of Museums, N.S. No. 5, 1928, 70 pp. (This document will be available from the ERIC Document Reproduction Service, probably by April 1971, in microfiche for 50c, in hardcopy for $3.60. Ask ERIC at Stanford for the document number to use in ordering.)

This study of the behavior of 200 visitors in four art museums includes the number of rooms visited, number of pictures observed, frequency of maximum times of observation of pictures, and length of visits. A "fatigue effect," whereby less time is spent on successive visits, was observed.

Harris H. Shettel *et al., Strategies for Determining Exhibit Effectiveness,* Pittsburgh: American Institutes for Research, 1968, 230 pp. Available from ERIC Document Reproduction Service in microfiche for $1, in hardcopy for $12.30, as document ED 026 718.

This study was undertaken for the U.S. Office of Education "to initiate the systematic development of research strategies that will make it possible to better evaluate the effectiveness of scientific and technical exhibits."

2. Some References on the Design of Evaluation Procedures

Donald T. Campbell and Julian C. Stanley, *Experimental and Quasi-Experimental Designs for Research,* In *1963 Handbook of Research on Teaching,* and reprinted in 1968 as a $2.50 paperback separate by Rand McNally & Co., Chicago, Ill.

The classic discussion of experimental design. Not popularized, but still readable by the non-expert.

Jack Crawford and Cathy Kielsmeier, *The Prudent Pea-Picker's Guide to Experimental Design* (with work book), 1970, Designs for Impact, Box 5217, Salem, Oregon.

A non-mathematical introduction to designing simple experiments.

J. D. Flanagan, "The Critical Incident Technique," *Psychological Bulletin,* Vol. 51 (1954), pp. 327-358.

Review of a basic way of getting a rich but manageable body of data before, during and after exposure to an instructional experience.

R. M. Gagné and W. D. Rohwer, Jr., "Instructional Psychology," *Annual Review of Psychology, 1969,* Palo Alto, Calif.: Annual Reviews, Inc., pp. 381-418.

Review of the state of the art.

II. REFERENCES PRIMARILY FOR MUSEUM PERSONNEL

A. General Writings on Education

Jerome S. Bruner, *The Process of Education,* Harvard University Press, 1960, and Random House Vintage $1.45 paperback, 1963, 113 pp.

Thoughts growing out of a conference of some 34 scientists, scholars, and educators in 1959 under Dr. Bruner's directorship, discussing how science education might be improved in U.S. elementary and secondary schools. The titles of the book and of the chapters ("The Importance of Structure," "Readiness for Learning," "Intuitive and Analytic Thinking," "Motives for Learning," "Aids to Teaching") accurately indicate the basic nature of the concerns in this report, with ideas on education not limited to the school setting. Dr. Bruner is a lucid writer as well as a profound thinker and psychologist.

Jerome S. Bruner, *On Knowing: Essays for the Left Hand,* Harvard University Press, 1962, and Atheneum $4 paperback, 1969, 165 pp.

Ten occasional essays centered around the theme of how we know and how knowledge reflects the structuring power of the human intellect, how we impart knowledge and teach the learner to construct his own world of learning. The "left hand" is fantasy, intuition. The "right hand" is systematic study, discipline, reason. Both hands are necessary to accomplish the tasks of knowing and of creation, working in concert. It has been customary in our time either to slight the role of "the left hand" or to make a separation between the left and the right, between feeling and reason, that over-emphasizes one or the other.

James B. Conant, *Modern Science and Modern Man,* Anchor Doubleday 95c paperback, 1959.

James B. Conant, *Science and Common Sense,* Yale University Press, 1951, $2.75.

James B. Conant, *The American High School Today,* McGraw-Hill, 1959, and Signet paperback, 1964, 141 pp., and *Slums and Suburbs,* McGraw-Hill, 1961.

Together these two books represent Dr. Conant's recommendations for improvement of secondary education in the United States, based on his study of the "comprehensive" American high school which aims at education for everyone. An influential work by a noted educator, scientist, and former president of Harvard, this led to a spate of studies pressing for curriculum reform.

Descriptive Case Studies of Nine Elementary School Media Centers in Three Inner Cities, 1969, 200 pp. Available from ERIC Document Reproduction Service in microfiche for $1 as document ED 037 082, regular printed copy available from Government Printing Office as publication OE-30021.

Descriptions prepared for U.S. Office of Education of content and program and frank evaluations of media centers in Buffalo, Cleveland, and Los Angeles. These would be of considerable value in planning to distribute pamphlets, models, or visual aids from museums to media centers.

Herbert Ginsberg and Sylvia Opper, *Piaget's Theory of Intellectual Development; an Introduction,* Prentice-Hall, 1969, 248 pp., $2.95.

Presents a biography of Piaget and a clear statement of his major theories of the intellectual development of children in non-technical terms.

Gilbert Highet, *The Art of Teaching,* a Random House Vintage $1.65 paperback, 1950, 266 pp.

Methods and general principles of teaching, cutting across all subjects. "Not a book of educational theory, but a book of suggestions drawn from practice." What makes a good teacher? What makes a great teacher? Includes a section on teaching in everyday life, as done by parents to children, family members to each other, doctors, priests, psychiatrists, politicians, propagandists, artists, authors, and others who teach consciously and unconsciously. A very good book.

John Holt, *How Children Learn,* New York: Pitman Publishing Co. $2.25 paperback, 1967, 189 pp.

Observations and reflections on the ways of a child's mind as it develops into an effective instrument of learning. Mostly on the young child's mind, before he gets to school. Anecdotal, written for the layman. Author is a teacher and observer of children in and out of schools. Considered a companion volume to his earlier book, *How Children Fail,* 1964.

John Holt, *How Children Fail,* New York: Pitman Publishing Co., 1969, and Delta $2.25 paperback (Dell Publishing Co.), 1970, 181 pp.

What is wrong with education in American schools in the mid-1960's, how schools fail to meet the needs of children, and distinctions between real and apparent learning. Written for laymen from a journal the author kept while observing and teaching in a fifth-grade class.

Innovation and Experiment in Education, a progress report of the Panel on Educational Research and Development...to the President's Science Advisory Committee, 1964, 79 pp., available from Government Printing Office, Washington, D.C. 20402 for 35c.

A representative and important statement on the need for educational reform at the time of its publication, this report should still have value to museum personnel seeking to become acquainted with the background and purpose of U.S. Government efforts to improve the quality of education, especially in the sciences.

Gayle Janowitz, *Helping Hands; Volunteer Work in Education,* University of Chicago Press $1.75 paperback, 1965, 125 pp.

A report from the front lines of volunteer efforts to create out-of-school supplementary study centers, certain to provoke thought by and rededication of museum volunteer docents.

The Journal of Aesthetic Education, quarterly, $7.50 a year, University of Illinois Press, Urbana, Ill. 61801.

Considers education in relation to new communications media and environmental arts. Frequently publishes basic education articles of interest to museum personnel.

George Leonard, *Education and Ecstasy,* Dell $2.25 paperback, 1969, 239 pp.

Ecstatic, slightly gushy book about the wrongs of current-day education, it includes suggestions for righting them before it's too late. Advocates the kind of learning that could take place in environments such as those museums provide and schools currently don't. Author is an editor on staff of *Look* magazine; portions of the book were serialized therein. Author also connected with Esalen Institute in California, which experiments with unorthodox modes of opening people (not necessarily intellectually) to responsive interaction with themselves, each other and the world(s) they live in.

Media and Methods, monthly, September through May, $7 a year, $7.50 in Canada, Media and Methods Institute, Inc., 134 N. 13th Street, Philadelphia, Pa. 19107.

Devoted to visual learning with concentration on audiovisual aids and motion pictures. Committed to innovation with a fresh approach that occasionally draws cries of outrage from readers. Excellent source for advertisements on commercially available media.

Maria Montessori, *The Discovery of the Child,* a 1948 revision of some of Dr. Montessori's earlier writings, $6.50, from Saint Leo League, Box 577, Newport, Rhode Island 02840.

Maria Montessori, *The Formation of Man,* $1.25 paperback from Saint Leo League, Box 577, Newport, Rhode Island 02840.

Résumé of Dr. Montessori's work, of her more important concepts, and of her approach to "world literacy."

Pacesetters in Innovation, cumulative issue of all projects in operation as of February, 1969, prepared for U.S. Office of Education, Government Printing Office (OE-20103-69), 584 pp., $5.

A compilation of project descriptions supported by planning and operational grants under Title III of the Elementary and Secondary Education Act of 1965, indexed by subject and locality. An excellent medium for museum personnel seeking to adapt ideas from supplementary education centers and programs throughout the nation.

Matilda B. Rees and William J. Paisley, *Social and Psychological Predictors of Information Seeking and Media Use, a Multivariate Re-analysis,* Stanford University: Institute for Communication Research, 1967, 112 pp. Available from ERIC Document Reproduction Service, in microfiche for 50c, in hardcopy for $6.50, as document ED 017 819.

A report on the use of the total communications system of society (museums are omitted) by adults. A pioneering study of selective use of different media. Of interest to museum personnel trying to determine where museums fit in the total system.

The Science Teacher, monthly, September through May, $8 a year, $1 single copy, National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036.

B. Extending the Museum into the School

Museum in the Classroom, Rosetta Stone Classroom Kit, Pictograph to Cuneiform Kit, Africa Kits I and II.

Developed under the direction of Professor Hyman Kavett of Richmond College of the City University of New York. Available from Alva Museum Replicas, 30-30 Northern Boulevard, Long Island City, New York 11101.

Linda Bloch, "The Red Box: An Improvised Suitcase Exhibit," *Museum News*, Vol. 48 (March, 1969), pp. 29-31.

Describes a traveling exhibit, circulated to schools from the Little Rock Museum of Science and Natural History. Intended to stimulate curiosity about natural objects.

Boston Children's Museum has circulating materials, match box units available for loan and sale in some fifteen subjects, and loan exhibits. For information write to the Children's Museum, Jamaicaway, Boston 02130.

The following Match Box material is available through the ERIC Document Reproduction Service:

Frederick H. Kresse, *Materials and Activities for Teachers and Children; a Project to Develop and Evaluate Multi-Media Kits for Elementary Schools*, Volume I, microfiche 50c, hardcopy $4.50, as document ED 033 614. Volume II, microfiche $1, hardcopy $11.50, as document ED 033 615.

Susan Schanck and Marion Carey, *Teacher's Guide to the Match Box Press*, microfiche 50c, hardcopy $4, as document ED 034 091.

Cynthia Cole and Edith Schroeder, *Teacher's Guide to the Houses Box*, microfiche 25c, hardcopy $2.15 as document ED 034 092.

Gillian Standring and Robert Bernath, *Teacher's Guide to Animal Camouflage*, microfiche 25c, hardcopy $2.05, as document ED 034 093.

Nancy Olson and Ellen Shapiro, *Teacher's Guide to Netsilik Eskimos*, microfiche 25c, hardcopy $2.80, as document ED 034 094.

Toby Levine *et al.*, *Teacher's Guide to Musical Sounds and Shapes*, microfiche 25c, hardcopy $2.15, as document ED 034 095.

Sharon Williamson and Ruth Green, *Teacher's Guide to Medieval People, a Dramatic Study*, microfiche 25c, hardcopy $2.30, as document ED 034 096.

Genevieve R. Keating *et al.*, *Teacher's Guide to the Rocks*, microfiche 25c, hardcopy $1.70, as document ED 034 097.

Eva Butler *et al.*, *Teacher's Guide to the Algonquins*, microfiche 50c, hardcopy $4.65, as document ED 034 098.

James Baird *et al.*, *Teacher's Guide to Grouping Birds*, microfiche 25c, hardcopy $2.25, as document ED 034 099.

Gillian Standring *et al.*, *Teacher's Guide to Seeds*, microfiche 25c, hardcopy $2.55, as document ED 034 100.

Buz Bever and Frederick H. Kresse, *Teacher's Guide to Paddle-to-the-Sea*, microfiche 50c, hardcopy $3.45, as document ED 034 101.

Binda Reich and Susan Schanck, *Teacher's Guide to Japanese Family 1966*, microfiche 50c, hardcopy $3.40, as document ED 034 102.

Richard Collin *et al.*, *Teacher's Guide to House of Ancient Greece*, microfiche 50c, hardcopy $3.65, as document ED 034 103.

Lee Tunney *et al.*, *Teacher's Guide to the City*, microfiche 25c, hardcopy $2.90, as document ED 034 104.

Nancy Olson *et al.*, *Teacher's Guide to Water Play*, microfiche 50c, hardcopy $3.20, as document ED 034 105.

Susan Williams and Sharon Williamson, *Teacher's Guide to Imagination Unlimited*, microfiche 25c, hardcopy $2.00, as document ED 034 106.

Jerome S. Bruner, "Man: A Course of Study," *ESI Quarterly Report*, Summer-Fall, 1965, Vol. III, No. 3, pp. 85-95. From Educational Services, Inc. (now Education Development Corp., 11 Brattle Street, Cambridge, Mass. 02138.)

Course and Curriculum Improvement Projects; Mathematics, Science, Engineering, National Science Foundation, available from Government Printing Office, 1966 (NSF 66-22), 117 pp., for 65c. See also: *Released Textbooks, Films and Other Teaching Materials Prepared by Course and Curriculum Improvement Projects Supported by the National Science Foundation*, U.S. Government Printing Office, 1968 (NSF 68-24), 72 pp.

"ERC Science Program," Educational Research Council of America, Annual Reports, ERC Papers in Science Education, *ERC Science News,* Rockefeller Building, Cleveland, Ohio 44113.

One objective of the ERC is the development of an interdisciplinary, sequential science program from kindergarten through grade 12 which may serve to coordinate new courses and curricula.

James J. Gallagher, *An Annotated Bibliography of Anthropological Materials for High School Use,* Macmillan paperback, 1967, 135 pp.

Lists 370 publications identified and evaluated by the Anthropology Curriculum Study Project, but does not include a list of museum-based resources.

David Hawkins, "Messing About in Science," *ESI Quarterly Report,* Summer-Fall, 1965, Vol. III, No. 3, pp. 39-44, Educational Services, Inc. (Now Educational Development Corp., 11 Brattle St., Cambridge, Mass. 02138). Also published in *Science and Children,* Vol. 2, No. 5 (February, 1965).

Hawkins, a physics teacher, sees three major phases in good teaching, applicable to all aspects of elementary education. Emphasizing flexibility and variation, he claims that "good science teaching moves from one phase to the other in a pattern which, though it will not follow mechanical rules or ever be twice the same, will evolve according to simple principles." Of particular value is the phase of "messing about," of free and unguided exploratory work. This phase has so far been the one most neglected in our approaches to education of children in the school setting.

Bartlett H. Hayes, Jr., *A Study of the Relation of Museum Art Exhibitions to Education,* 1967, 54pp. Available from ERIC Document Reproduction Service, in microfiche for 25c, in hardcopy for $2.80, as document ED 026 403.

Reports on the practice of 57 museums in various locations, and offers recommendations for closer consultation between schools and art museums.

Hazel W. Hertzberg, *The Great Tree and the Longhouse: The Culture of the Iroquois,* Macmillan $2.40 paperback, 1966, 122 pp. (A teacher's manual is $1.20.)

Produced by the Anthropology Curriculum Study Project. An excellent example of imaginative presentation of a culture, which could readily be illustrated with museum objects.

Carl S. Johnson, David L. Erickson and Charles A. Dambach, *Qualities of Conservation Materials,* Transactions of the 31st North American Wildlife and Natural Resources Conference (Washington: Wildlife Management Institute), 1966, pp. 396-406.

Conclusions based on a two-year study of about 8,000 titles (of the estimated 20,000 available!) of free or inexpensive materials regarding the conservation of nature offered to schools by governmental and commercial sources in 1963. This preliminary report was sharply critical of agency and industry bias, poor appearance, unreadability owing to the use of technical language, and failure to deal with radioactive wastes, air pollution, land-use planning and population control, as well as general neglect of soil, mineral, and water resources. The analysis of these materials continues under the direction of Dr. Carl S. Johnson, Professor of Conservation, Natural Resources Institute, Ohio State University, and will be of interest to museums seeking to develop school materials on environmental topics. (The summary of the project, "Survey of Printed Materials for Conservation Education," No. 5-1058, is available from the ERIC Document Reproduction Service, in microfiche for $1.25, in hardcopy for $14.85, as ED 014 434.)

Alice Marriott, *Kiowa Years; a Study in Culture Impact,* a $2.40 Macmillan paperback, 1968, 173 pp.

Produced by the Anthropology Curriculum Study Project, with a teacher's guide also available. Museum materials for the classroom might be programmed to supplement this kind of presentation on the interaction of cultures.

Alan R. Munro, "The Yellow Submarine," *Museum News,* Vol. 46 (Feb., 1968), pp. 20-23.

Describes a mobile museum devoted to introducing Tennessee children to the ancient seas from which Appalachia was formed. Exhibit contents are listed, and the budget for a total learning environment trailer with imaginative visual aids is presented.

David Stansfield, *The Multi-Media Kit on the 1930s,* available from the Ontario Institute for Studies in Education, 252 Bloor Street West, Toronto 5, Ontario, Canada.

Secondary level assortment of filmstrips, tapes, records, pictures, stamps, etc. relating to life in North America in the 1930s.

Lydia Powel, *The Art Museum Comes to the School,* Harper and Bros., 1944, 160 pp., Foreword by Thomas Munro. (This document is now out of print, but is available in some libraries.)

A critical review of a cooperative program conducted by five museums and their school systems with support from the General Education Board of New York. It includes valuable discussion of the dynamics of cooperation, and the need for exhibition space in schools and more flexible scheduling.

Ferdinand S. Ruth, "Natural History Teaching Kits," *Museum News,* Vol. 44 (Nov., 1965), pp. 33-40.

Describes portable cases prepared by the Lawrence Hall of Science, Berkeley, California, containing marine animals, animal kingdom survey, amphibians and reptiles, bird study skins, and mammal study skins (as well as specimens in drawers and botanical specimens) which introduce natural history specimens directly to the classroom. Books which accompany the exhibits are cited.

Schools and Museums; a Report on the School Museum Cooperative Education Project, Curriculum Development Center, State University of New York, Albany, 1968, 31 pp.

A concise summary of joint school-museum activities and program relationships.

C. Explorations Bearing Upon Museum Potentials for Education

Rudolf Arnheim, *Toward a Psychology of Art. Collected Essays,* University of California Press, Berkeley, 1966, 375 pp., $10.

Topics covered include perception, expression, symbolism, creativity, and means of studying the work of art as an objective entity with the visible world.

Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality; a Treatise in the Sociology of Knowledge,* Doubleday, 1966, and Doubleday Anchor $1.45 paperback, 1967.

This discussion of social processes that contribute to the sense of reality provides a conceptual framework for considering the "reality" which is so often attributed to museum objects.

G. Evelyn Hutchinson, *The Ecological Theater and the Evolutionary Play,* Yale University Press, 1965, $5.

These wise essays illuminate the humanist commitment central to much of science and exemplify the kinds of analysis which bring museum objects unforgettably to life.

George Kubler, *The Shape of Time; Remarks on the History of Things,* Yale University Press $1.45 paperback, 1968, 148 pp.

The degrees of creativity manifested by artifacts are the object of this study, which seeks to gauge the extent of innovations by situating them in sequences of interrelated forms.

Marshall McLuhan, *Understanding Media: The Extensions of Man,* 2nd ed., Signet 95c paperback, 1964.

All should play this conceptual shell game, which imposes severe tests upon one's system of categories regarding perception and learning. It should prompt museum personnel to reconsider their views of the needs of children and the potentialities of visual learning.

Herbert Read, *Education Through Art,* London: Faber and Faber, 1943, 343 pp., also available from Transatlantic Art, North Village Green, Levittown, Long Island, N.Y. 11756 for $2.95.

Much benefit can be derived from this thoughtful analysis of learning.

Philip C. Ritterbush, *The Art of Organic Forms,* Smithsonian Institution Press, 1968, 168 pp., $10.

Treats the visual imagination in biology as the source of an esthetic endowment in organic forms that has rendered them attractive to twentieth-century artists, contending that as a result works of abstract art can be employed to teach about science. See also "Science Teaching and the Future," *The Science Teacher,* Vol. 36, No. 6 (September, 1969), pp. 32-39.

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