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A BASIC REFERENCE SHELF ON FACILITIES FOR INSTRUCTIONAL MEDIA. A SERIES ONE PAPER FROM ERIC AT STANFORD.

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DESCRIPTORS- *ANNOTATED BIBLIOGRAPHIES, ESTIMATED COSTS, CONSTRUCTION COSTS, TEACHING TECHNIQUES, *INSTRUCTIONAL MEDIA, EDUCATIONAL FACILITIES, SCHOOL DESIGN, *EDUCATIONAL PLANNING, EDUCATIONAL ENVIRONMENT, SCHOOL CONSTRUCTION, ENROLLMENT TRENDS, EDUCATIONAL EQUIPMENT, *FACILITY CASE STUDIES, EDUCATIONAL FACILITIES LAB. INC., STANFORD SCHOOL PLANNING LAB.,

ANNOTATED REFERENCES ENCOMPASS DESIGN, PLANNING, CONSTRUCTION COSTS, TECHNICAL EQUIPMENT, AND TEACHING TECHNIQUES FOR SCHOOLS AT ALL LEVELS WHICH UTILIZE THE NEW INSTRUCTIONAL MEDIA. EDUCATIONAL FACILITIES LABORATORIES, INC. WHICH HAS BEEN ESTABLISHED TO ENCOURAGE RESEARCH, AND APPLICATIONS OF NEW IDEAS FOR THE ENVIRONMENTS OF GROWING INSTITUTIONS, HAS TWO REGIONAL CENTERS, ONE AT STANFORD, AND ONE AT THE UNIVERSITY OF TENNESSEE, SCHOOL DISTRICTS MUST BE AWARE OF AND REQUEST THE CENTER'S PLANNING SERVICES IN ORDER TO BENEFIT FROM THEM. (LH)

A SERIES ONE PAPER FROM

ERIC at Stanford

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A BASIC REFERENCE SHELF ON FACILITIES FOR INSTRUCTIONAL MEDIA

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FACILITIES FOR INSTRUCTIONAL MEDIA

During the past decade, change in the educational environment has paralleled the technological changes in our society. Better building materials, computerized school scheduling, and the increased use of electronic teaching aids are but a few of the scientific developments which have given a new shape to school facilities and a new direction to the educational process. Construction components and school equipment that educators have dreamed of for many years are available today--from prefabricated roof trusses to portable television systems--and at costs compatible with school budgets.

But the innovative ideas and techniques which may help us solve problems are often lost amid the shuffle of everyday routine and traditional school planning procedures. When innovation comes late, it must overcome rigid facilities and backward programs that can cramp educational growth for generations.

One organization that has been created to assist school districts in developing modern planning procedures is Educational Facilities Laboratories, Inc. EFL was established by the Ford Foundation to encourage research, experimentation, and the dissemination of knowledge regarding educational facilities. This paper consists of two parts. After discussion of the basic documents on the planning of facilities for instructional media, some of the activities of EFL will be described, with examples of the operation of the Stanford School Planning Laboratory provided.

I. SUGGESTIONS FOR READING

1. Dave Chapman, Inc., Industrial Design. *Design for ETV: Planning for Schools With Television.* New York: Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022 (Revised 1968). 96 pp.

The best comprehensive summary concerning the implications of television on the planning of school buildings. A broad range of educational and environmental factors are discussed. Chapters include: 1) planning schools with TV, including origination, transmission, and reception, 2) the factors of seeing, hearing and learning with emphasis on image size, viewing angles, and viewing distances, 3) designs for groups ranging in size from seminars of 2-6 students to large groups of 200 or more pupils, 4) educational facilities in the school including TV mounting, TV components, and space dividers, and 5) the use of existing space. The study provides a practical guide to the technical aspects of television and contains a large number of excellent diagrams showing space arrangements.

2. DeBernardis, Amo, and others. *Planning Schools for New Media.* U. S. Department of Health, Education & Welfare, Office of Education OE-21021. Washington, D.C.: Government Printing Office, 1962. 72 pp.

The manual is a guide for planning schools within which recently developed technical teaching aids can be used. Special emphasis is given to the storage, distribution, and utilization of instructional media. Various parts of a school building are discussed including: 1) the instructional materials center, 2) classrooms, 3) language laboratories, 4) auditoriums and multi-purpose rooms, 5) intercommunication systems, 6) radio facilities, and 7) television facilities.

3. *Spectrum of Electronic Teaching Aids in Education.* School Planning Lab, School of Education, Stanford University, 1965. 23 pp. (Out of print--this will be available again in Summer 1968, from the ERIC Document Reproduction Service, after it is listed in one of the monthly issues of *Research in Education.*

The report presents a brief, non-technical pictorial overview of the educational potential and approximate cost of certain configurations of electronic, audio, audio-visual, and television teaching systems. It presents a number of audio-visual system configurations for extending instruction to more students in less time. The presentation takes into

account small, medium, and large student groups, and also describes emerging systems which can be adapted to various modes of student participation. The booklet attempts to impose order on existing technology by categorizing equipment according to: 1) the extent to which modes of learning are served, 2) the nature and complexity of the hardware and systems, and 3) the estimated budget required for a given systems configuration.

4. *The Impact of Technology on the Library Building.* Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1967. 20 pp. (Out of print--this will be available again in Summer, 1968, from the ERIC Document Reproduction Service, after it is listed in one of the monthly issues of *Research in Education.*)

A position paper examining the expanding possibilities for management of information due to technological development of computers, microfilm and communications. One section discusses the implications computers will have on buildings. Although the report indicates the book will continue to be the main medium of information for at least the next twenty years, technology will require modified library buildings. Changes will involve trade-offs in space and demands for additional space, not less.

5. Hauf, Harold, Wayne Koppes, Alan Green, Morton Gassman, and David Haviland. *New Spaces for Learning: Designing College Facilities to Utilize Instructional Aids and Media.* Revised edition. Center for Architectural Research, Rensselaer Polytechnic Institute, Troy, New York, 1966. 137 pp. (Copies are available from Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022.)

A comprehensive and non-technical report on designing schools to optimize benefits from instructional media. Even though the title indicates the publication is intended primarily for college facilities, the majority of the text is applicable to any grade level. The authors have included a comprehensive coverage of such topics as media, facilities, planning factors, design factors and design studies.

6. *Divisible Auditoriums*. Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1966. 48 pp. (Out of print--this will be available again in Summer 1968, from the ERIC Document Reproduction Service, after it is listed in one of the monthly issues of *Research in Education*.)

The report discusses numerous ideas that have been pivotal in the development of the divisible auditorium and the divisible theatre. The adaptations discussed reflect new trends in instructional methods and are designed to accommodate varied use of audio-visual devices. Several installations are represented with diagramatic sketches indicating the operable, sound-retarding partitions used to create more than one usable instructional space within the auditorium.

7. Gilmore, Henry Martin, Jr. "The Relationship Between New Instructional Programs and Certain Selected Flexible Features of School Buildings." (Doctoral dissertation, University of Washington, Seattle) Ann Arbor, Mich.: University Microfilms, 1965. No. 65-11,462. 196 pp.

The stated purposes of the study were to determine how new instructional programs utilized flexible features, and to determine if flexibility of school buildings was a factor in the establishment and development of new instructional programs. Conclusions indicate flexibility is needed for the success of new programs and that the presence of flexible facilities leads to development of new programs. Recommendations include use of continuous floor and ceilings, large spaces, individual study spaces, movable partitions, and non-load-bearing walls free from utility lines.

8. *SCSD: The Project and the Schools*. Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1967. 92 pp.

Thirteen California school districts grouped together, analyzed the construction needs posed by secondary school programs, and then asked manufacturers to develop new products to meet technical specifications. This publication reports on the School Construction Systems Development (SCSD) approach to constructing schools more rapidly and economically.

Separate sections discuss educational requirements, system performance specifications, and SCSD components such as identical steel structural parts, ceiling and lighting components, air-conditioning units, interior partitions, cabinets and lockers.

9. Ellsworth, Ralph E. and Hobart D. Wagener. *The School Library Facilities for Independent Study in the Secondary School.* Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1963. 142 pp.

The report emphasizes the changing role of libraries in view of goals in a changing educational program. The current emphasis is on self-instruction and independent study, and the report concerns itself with the creation of good working libraries that permit individual students to pursue knowledge independently. The implications of team teaching, automation, and self-teaching devices are explored. Also discussed are the recent advances in science, mathematics, and languages. The importance of study carrels is analyzed. Suggestions are made as to size, circulation, layout, and environmental elements. Numerous schematic plans and arrangements are shown for carrels and central libraries.

10. Farmer, Margaret and Ruth Weinstock. *Schools Without Walls.* Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1965. 56 pp.

The report discusses schools designed without interior partitions. It explains how "open-space" schools are a logical outcome of efforts to develop sufficient flexibility of teaching spaces to adapt teaching procedures. Described are team teaching techniques used at the Dilworth School in San Jose, California, which is the prototype of current schools with large open spaces instead of traditional classrooms. Reference is made to other schools with open plans. Guidelines for space utilization are provided in the section entitled "Making Open Space Work." Problems peculiar to this type of school which are discussed involve acoustics, the use of audio-visual equipment, scheduling, partitioning, and equipment.

11. Gores, Harold D. "Schoolhouse in Transition." *The Changing American School.* (Edited by John I. Goodlad). Sixty-fifth Yearbook, Part II, National Society of the Study of Education. University of Chicago Press, Chicago, Illinois, 1966. Chapter 6, pp. 135-151.

A general discussion indicating that after 100 years of design dictated by the graded classroom, a new type of school building has broken the tradition. With new ways of getting information to pupils available, educators have appraised old instructional procedures and organizational arrangements. The result has been introduction of the non-graded school, team teaching, seminars, individual study, programmed instruction and educational television. Future changes which can be predicted include major revision in content, improved knowledge about the learning processes, and advances in teaching technology. All of these affect the form and structure of schools.

12. *Guide for Planning School Plants.* National Council on Schoolhouse Construction, which now is known as Council of Educational Facility Planners, 29 W. Woodruff Avenue, Columbus, Ohio, 43210, 1964. 156 pp.

This serves as an excellent basic reference on school plant planning and construction. It guides the reader in interpreting and applying principles of planning for effective school plants, and emphasizes the relationship between educational buildings and educational programs. New information is presented on the following topics: 1) planning and programming the educational plant, 2) spaces and equipment for learning, 3) non-instructional plant facilities, 4) balanced conditioning of spaces, and 5) principles of economy and planning resources.

13. Nimnicht, Glendon P. and Arthur Partridge. *Designs for Small High Schools.* Educational Planning Service, Colorado State College, Greeley, Colorado, 1962. 83 pp.

This report attempts to answer the question "How can facilities be designed so that small high schools can house efficient and

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13. Nimnicht, Glendon P. and Arthur Partridge. *Designs for Small High Schools.* Educational Planning Service, Colorado State College, Greeley, Colorado, 1962. 83 pp.

This report attempts to answer the question "How can facilities be designed so that small high schools can house efficient and

comprehensive educational programs?" Design of facilities for multiple class teaching, team teaching, and teaching of special subjects is discussed and illustrated by sketches and photographs. The report presents illustrations of how some of the nation's outstanding small high schools have used these approaches effectively, and analyzes in some detail the implications of each.

14. Cooper, James G. and Carl H. Ivey (New Mexico Dept. of Education). *A Comparative Study of the Educational Environment and the Educational Outcomes in an Underground School, a Windowless School, and Conventional Schools.* New Mexico Department of Education, Santa Fe, New Mexico, 1964. 82 pp.

The study was an investigation into the effects of a combined underground elementary school and fallout shelter upon the educational climate within the school. Findings regarding anxiety, scholastic achievement, motivation, social structure, and pupil-teacher relations indicated no significant differences between the underground school-shelter environment and the above-ground schools. No significant differences were found in the general anxiety level and attitudes of teachers, either.

15. Fitzroy, Dariel and John L. Reid. *Acoustical Environment of School Buildings.* Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, N.Y., 10022, 1963. 128 pp. (Out of print--this will be available again in Summer 1968, from the ERIC Document Reproduction Service, after it is listed in one of the monthly issues of *Research in Education.*)

This report serves as a resource for school administrators, architects, and acoustical engineers. It is based on actual conditions existing in schools throughout the country, and trends in school construction and design are discussed. The major objective of this study was to determine the minimum acoustical separation necessary to allow a seminar group or an individual student to work effectively. Floor plans are included.

16. Larson, C. Theodore (Director, School Environments Research Project). *Environmental Abstracts*, Publication #874. Publications Distribution Service, University of Michigan, Ann Arbor, Mich., 48106, 1965. 768 pp. $15.

This collection of annotated abstracts reviews the existing literature linking environment with human behavior. The report indicates there is a lack of research concerning the effects of the total environment on the learning process. To date, research has concentrated on fragmented aspects or components of environment such as light, sound and heat.

17. Larson, C. Theodore (Director, School Environments Research Project). *Environmental Evaluations*, Publication #875. Publications Distribution Service, University of Michigan, Ann Arbor, Mich., 48106, 1965. 186 pp. $5.

The present state of knowledge of environmental relationships is summarized. A group of six technical papers prepared by project staff members appraise the current knowledge with respect to the interactions of man and his environment as well as the specific effects of space, thermal environment, luminous environment, sonic environment and social environment on the learning situation.

18. Larson, C. Theodore (Director, School Environment Research Project). *Environmental Analysis*, Publication #876. Publications Distribution Service, University of Michigan, Ann Arbor, Mich., 48106, 1965. 72 pp. $4.

A method of investigation is discussed for the inquiry: "How does environment affect human behavior?" Included are diagrammatic models that assist in understanding and analyzing critical factors in experimental research. In defining specific environmental relationships, the authors discuss the following questions: 1) what constitutes the particular learning environment? 2) who precisely is the learner or group of learners? and 3) what is the particular learning activity being performed? Separate chapters are devoted to procedures of processing information and their environmental design implications.

19. Larson, C. Theodore. *The Effect of Windowless Classrooms on Elementary School Children.* Publication #510. Publications Distribution Service, University of Michigan, Ann Arbor, Mich., 48106, 1965. 111 pp. $2.

A case study of two schools, one with windows, and the other without. Children in the experimental school in Wayne, Michigan, showed little personal interest in whether their classrooms had windows or not. A windowless environment may have some small effect on learning achievement depending on the nature of the group and whether the class is task oriented. A positive finding indicated that teachers preferred windowless classrooms after they had the experience of teaching in such an environment.

20. Peccolo, Charles. *The Effects of Thermal Environment on Learning.* Iowa Center for Research in School Administration. University of Iowa, Iowa City, Iowa, 1962. 30 pp.

The study is an attempt to learn more about: 1) to what extent thermal conditions are being controlled in the classroom, 2) the optimum thermal conditions needed for various kinds of learning, 3) whether established standards of comfort based on adult norms are appropriate for children, and 4) whether public school educators recognize the many factors involved in determining and maintaining an adequate thermal environment. Extensive charts, graphs, and tables are included in the digest.

21. *The Use of Architectural Acoustical Materials: Theory and Practice.* Acoustical Materials Association, 335 E. 45th St., New York, N.Y., 10017, 1965. 36 pp. 50¢.

A semi-technical discussion concerning the use of acoustical materials for sound absorption. Sections discuss the basic properties of sound and its reflection and absorption, the acoustical design of auditoriums, and the properties of acoustical materials. The appendix presents a more technical discussion of several acoustical measurement procedures.

22. Illuminating Engineering Society. *American Standard Guide for School Lighting.* American Institute of Architecture, Illuminating

Engineering Society, and National Council on Schoolhouse Construction, New York, 1962. 40 pp. Copies are available at 70¢ from Illuminating Engineering Society, 345 E. 47th St., New York, N.Y., 10017. There is a $1. service charge on orders under $5.

This guide is written as non-technically as possible so educators as well as architects and engineers may use it. The goals of a satisfactory visual environment are stated, and the variables involved are described. Additional material discusses quantity of illumination, glare, the "scissors curve" graph as a means of assessing the limits of source brightness, systems in illumination, and special applications to functional areas of the school building. Many illustrations are included, coupled with an extensive bibliography. Of particular value is the intensive treatment of illumination problems and experiments and a section defining basic terminology essential to an understanding of the illumination field.

II. THE ACTIVITIES OF EDUCATIONAL FACILITIES LABORATORIES AND THE STANFORD SCHOOL PLANNING LABORATORY

In outline, EFL's program is concerned with

1. OVER-ALL INSTITUTIONAL PLANNING: helping institutions with increasing enrollments ensure that their growth will be orderly.

2. DESIGN AND CONSTRUCTION OF THE ELEMENTS: helping institutions create or re-create the parts of their physical environment that serve a special function: classrooms, libraries, laboratories, dormitories, auditoriums and gymnasiums.

3. THE TOOLS: helping institutions to select and, where necessary, invent the equipment, apparatus, and aids which support instruction.

4. INCREASING THE PUBLIC KNOWLEDGE: assisting institutions and the general public in making decisions about physical facilities.

It is the things of education--site, buildings, equipment and books--that EFL involves itself with. These things are important because they constitute not only environment but also the tools of learning.

EFL's efforts and expenditures have been devoted to elementary-secondary schools, to higher education, and to research and experimentation applicable to education at all levels. Recently, however, the emphasis has shifted to the problems of higher education, particularly those problems imposed by enrollment increase.

EFL cannot buy buildings or even building plans for any institution. What it can do--and does--is to invest the risk capital required in the development of new and promising solutions to the problems of design, planning, and construction.

Some of EFL's projects and self-administered programs have led to buildings, others to reports or plans. While numerous projects are completed, many are still in progress. Some have been aimed at small specific questions, others at the concept of how to build an entire school or college.

Most EFL projects, no matter what their primary aim, also are planned to increase public understanding of educational buildings. A number of EFL programs are aimed directly at increasing the public knowledge. To this end, EFL has published numerous reports.

EFL's REGIONAL CENTERS

To strengthen contact with educators, architects, and planners in the West and Southeast, EFL has established Regional Centers at Stanford University and the University of Tennessee. Substantial assistance for the operation of the centers has been granted by EFL to the School Planning Laboratory at Stanford and the School Planning Laboratory at the University of Tennessee. The centers, directed by Professor James D. MacConnell and Professor John W. Gilliland, respectively, have stimulated modern developments in school buildings. To illustrate their activity, we shall describe the Stanford center.

The School Planning Laboratory (SPL) is part of the School of Education at Stanford University. It disseminates the latest information on educational facilities innovation and design, and provides field service assistance to school districts with planning problems.

Probably SPL plays its most significant educational role in districts whose administrators seek its guidance and assistance. SPL engages in field service efforts through which school boards, school districts, and individual schools are assisted with their planning problems. This assistance may take the form of building a master plan for an entire district, writing educational specifications for a specific school facility, or working with local planning groups in making a continuing survey of an area's existing and anticipated educational resources and needs. The planning problems of each school district and the educational specifications required for any specific school facility are inevitably unique to that district or school.

SPL has developed special techniques for the planning of school facilities. Where such processes have been used effectively, savings have usually resulted which more than pay for the cost of the study and planning involved.

Generally, such planning can be broken down into three categories: 1) long-range master planning, 2) planning of educational specifications, and 3) planning of interior space utilization.

Master planning consists of making population projections to determine building needs in advance, so that school sites can be purchased early. In a rapidly developing suburban area where land prices multiply several times in four or five years, a substantial savings may accrue. Also, planning allows better location of schools in relationship to attendance centers.

A second category concerns developing detailed educational specifications for individual buildings. Adequately planning the construction of individual buildings results in several types of savings. First, a careful study of instructional area needs results in the allocation of

sufficient teaching space and avoids wasted space. This principle applies equally to storage and administrative space and to service areas in a school. Second, proper planning will provide flexible space that can be rapidly converted from one configuration to another, depending on the educational activities.

The third category involves planning interior space utilization. The design of each space and the furniture and equipment for each space is specified in detail, based on the educational activities that are to take place in the space. To assure that a space is functional, the equipment must be of a size and type that permits the intended learning experience to occur.

Most of the money spent for school sites, school buildings and school equipment today is being expended without complete planning. The problem is to alert individual school districts and private institutions to the planning procedures that have been developed, and make it possible for them to use such techniques in their own planning.