DESIGNS FOR LEARNING: CASE/SPACE STUDIES IN A UNIVERSITY, A PRISON, A LABORATORY, AND A PUBLIC SCHOOL

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This presentation will focus on five specific learning programs as illustrations of the change process caused by the interaction between the behavior of the subjects, the increased knowledge of the investigators, and the physical environment originally designed for each project. Excerpts from various publications have been included in the bibliography. This material describes the learning problems and environmental conditions that were present in the five projects: the Design Department and Experimental Freshman Year Programs at Southern Illinois University, CASE I and CASE II programs at the National Training School for Boys (Washington, D.C.), and the Programming Interpersonal Curricula for Adolescents (PICA) Program for junior high school students in the Washington, D.C. metropolitan area. The discussion will also include a slide presentation outlining the floor and area/use/time descriptions of the five projects.

Introduction

All educational programs (curricula) and the environments which support them are symbiotic partners in the process of moving students from incompetence to competence, from defeat to success. The case studies will describe the plan for the development of a learning ecology which emphasizes the relationship between man's behavior and his surroundings. Although consequences influence man's designs, the physical environment directs and delivers the cues which instruct him. For example, an overhang indicates shelter from a driving rain or penetrating sun, and an ashtray on the table indicates that smoking is permitted. Buildings provide not only protection from the natural elements (rain, snow, insects, noxious animals) but their planners, designers, and builders dictate instructions for their use as a result of their design decisions affecting structure and form. The walls, doors, dividers, and furniture--be they transparent, translucent or opaque--are behavior cues for the inhabitants. Although the designer produces his product based upon man's present description of his problem and a functional analysis of needs, the final physical structure once established as permanent real estate, with banking and bonding as a long-range investment, shapes and continues to maintain a large amount of the behavior of those that use the structure decades later.

This paper and oral presentation will use both slides and printed visuals to illustrate the application of a behavioral approach to the design of learning environments for the Department of Design at Southern Illinois University, the Experimental Freshman Year Program at S.I.U. (involving a group of 66 students normally not permitted to enter the University), the CASE I Project at the National Training School for Boys, Washington, D.C. (three hours of education per day for incarcerated delinquent youth), the CASE II Project also at the National Training School for Boys (a 24-hour total living, work, study, recreational facility for a similar clientele), and a laboratory public school classroom model developed for students from 12-15 who were experiencing both academic (mathematics and English) and interpersonal problems in their public junior high schools.

The live presentation will describe the initial differentiation of functions as developed by the author in the creation of these various facilities and will carry the development of some of these concepts throughout all of the cases mentioned. For the Department of Design, the emphasis is on the concepts of nesting (the individual's space), the home away from

home, and "the space between," a large, open area for individual and group student use. In the Experimental Freshman Year, the differentiating of space becomes more particular, and the environmental controls (the materials being made mainly out of paperboard) become a dynamic part of the learning function. The development of the listening/looking space and the separating out of quiet and active lounge areas is further developed. The nesting places, with telephones and typewriters, become private offices for each of the 66 students. In the CASE I Project, extremely explicit contingency systems were established, and further separation of functions helped determine the effects of cost and timing manipulation as these directly affected the use of space and the support of its originally-designed function. Because of the introduction of newly programmed instructional material, new spaces were designed which required a variety of monitoring: program checking, program testing, study areas and individual study booths. The quiet lounge becomes the library, the active lounge becomes the home lounge and the need for privacy becomes the rented private office.

In the CASE II Project, a four-story building is converted into a total living/learning facility for over 40 students for one full year. Here the introduction of all human functions such as sleeping, bathing, grooming, eating, as well as academic, social and interpersonal curricula becomes a part of the design for learning. Family visits, weekend leisure activity and the maintenance of 28 staff plus the continuous flow of professional visitors--over 700 in approximately 200 available open days--provided an unusual opportunity to discern the effects of the manipulation of cost consequences and environmental changes as these directly affected both the learning and the lifestyle of the student/inmates.

The final case in the paper will deal with the development of an in-house laboratory at the Institute for Behavioral Research as part of a six-year study for instituting environmental and curricular changes in standard junior high schools in the Washington, D.C. area. The reshuffling of schedules as well as the redesigning of laboratory spaces included the development of I.P.I. and teacher-classroom programs. These were carried out for three years before the program was experimentally introduced into one local public junior high school. As of this present moment, the program is in three different school systems and a description of the procedures and operational changes both in space and design and curricular support will be described as it derived from the time/function analysis.

In summary, this presentation will attempt to merge the basic tenets of what the author calls behavioral architecture and operant psychology into a direction for resolving part of the dilemma described by Lazlow-Moholy-Nagy in his book Vision in Motion: "Emotionally most people live within the old dimensions of anachronistic fixations, tribal prejudices. They are immune against any suggestion for a better use of their resources because in our verbalistic society all such arguments can be answered by

counterarguments for the preservation of the status quo. What is needed is a rediscovery of the elements of existence, work, recreation, and a fearless demonstration of their fundamentals relative to our time without paralogy. We have to free the elements of existence from historic accretions, from the turgid symbolism of past association, so that their function and effectiveness will be unimpaired," and what Louis H. Sullivan described in his book Kindergarten Chats: "...if we would know why certain things are as they are in our disheartening architecture, we must look to the people; for our buildings, as a whole, are but a huge screen behind which are our people as a whole--even though specifically the buildings are individual images of those to whom, as a class, the public has delegated and entrusted its power to build."

Statement of Problem

The major end product of man's learning is his continued survival, the basic requirement for learning is behavior, and the critical part of the learning chain is consequences. Because of the consequences resulting from blind selection, people quickly learn to differentiate between empty and full resources, between behavioral investments that pay off and those that are dry dead ends. Changing environments produce new stimuli, new situations. Higher organisms placed in new or changing environments rely upon their past successful behaviors to help govern their present behavioral decisions. As a complex living organism, man, in his learning behaviors, appears to differ from other organisms only in the constraint of his prescribed biophysical blueprint (brain size, eyes, hands, temperature, etc.).

In the learning process, man, as a biological organism, interacts with his environment. However, unlike some of his nearest cousins, man can reshape his environment to satisfy his needs, and he ventures far from his birthplace--his original geographic assignment. He has designed his local environmental control system, his home, and he attempts to control his expanding daily horizon--the city, state, nation, and the broadest sweep of his mobility--the world. Although he functions as a part of a total industrial ecology, with political, economic, and social constraints, he often behaves as if he were functionally independent.

Industrial man is beginning to learn the painful lesson of what happens when he ignores the functionally interdependent systems of nature. His blind intervention and lack of planning and control have resulted in consequences which threaten his health and well-being. The recent long periods of urban air pollution, the stench of tons of dead fish along the shores of the Great Lakes, the augmented disappearance of crustacean beds and brackish water breeding grounds by fuel oil, detergent discharge, and the building of new coastal highways, are but small stones in the possible avalanche being created by his ignorance. For man to go from an agrarian planner, dealing with local and seasonal conditions, to a technological and

scientific world planner, dealing with cities of 20-to-40 million and international social and educational systems, will require many reappraisals.

What Is All This Environmental Design For?

Newspapers bombard the public daily with reports of what society considers "deviant" behavior. "Deviancy" in these reports is generally interpreted as denoting a departure from "normal" legal, social, or moral standards. All societies have an unwritten code, and most of them also a written code, specifying what that society accepts as normal behavior. However, these specifications vary widely with a number of factors, including geographic location, ethnic origin, religious tradition, economic condition, and time.

"Normalcy" can be defined in statistical, moral, medical, legal, or conventional terms. The classification of any specific behavior as "normal" or "deviant" depends upon the type of definition used.

Normal behavior in the statistical sense is defined in terms of the incidence of a particular type of behavior in the population; i.e., the central tendencies of the population distribution. Yet some behaviors sufficiently common to be accepted as "normal" from the statistical standpoint (e.g., smoking, excessive use of alcohol and other drugs) are considered abnormal or deviant from the medical standpoint, since they depart from a standard of healthful behavior. Legal standards of behavior differ markedly from time to time and from place to place. Dueling, once the only acceptable response to insult or injury among gentlemen, is now forbidden. Today, homosexual behavior between two consenting adults in the privacy of their own dwelling is legally permissible in some states--Illinois, for instance--but a criminal offense in other states.

Conventions and moral codes are less rigid than the law, but even more pervasive in setting the standards by which a behavior is judged normal or deviant; in fact, laws are the formulations of moral codes and conventions into legally enforceable regulations. Thus, different laws, moral codes, and customs in different localities and times can change the consequences of the behavior without in any way altering the behavior itself.

Historically, the most widespread of legal and moral standards has been that forbidding the taking of human life. Every government has established laws against murder, yet there has scarcely ever been a time when war was not being waged somewhere in the world. A declaration of war is tantamount to a license to commit murder, with the government deciding whom it is legally and morally correct to kill as a matter of national defense or in fulfillment of its political and social objectives.

Appropriateness of Behaviors

As one examines these different kinds of environments and standards it becomes apparent that no behavior of which a human being is capable is, in itself, normal or deviant, good or bad, sane or insane. It is simply appropriate or inappropriate to the environment and social milieu in which it occurs. Every group defines what it considers acceptable behavior. Every environment has "go" and "no go" signals indicating to the behaving individual whether his behavior is appropriate or inappropriate for that group.

The contingencies that the environment provides for certain kinds of behaviors stimulate and maintain those behaviors. We recognize this intuitively, if not intellectually. We question odd behavior--behavior not generally appropriate to the setting. If we cannot understand why an individual behaves as he does, what he gets out of it, we tend to label his behavior abnormal, deviant, or crazy. If we understand his motives but judge that his behavior conflicts with the interests of the group, we call the behavior criminal. Most behaviors are classified as socially acceptable or deviant on this basis. Yet, when someone pursues an acceptable goal--for instance, money and the success and material goods that money represents, through an unacceptable behavior, e.g., stealing--we seldom stop to examine the alternative behaviors society has made available to him for attaining this goal.

Current Environmental Design Practices

The present day architect/designer, in the main, acts as a paid servant and is brought in to cover the equipment, protect (in an educational setting) the student, teachers and administrators from heat, cold, rain, snow, insects and one another. He claims full success for an economic solution to the problem; full success for the beautiful detailing, the integrating concept of the plan, the shade patterns and the traffic in-flow. But his bravado, if earned, is really beside the point. Today almost any reasonable architect and builder can keep the rain and bugs out and the students and teachers in. Architecture is the specific control of environment by the use of physical controls, called rooms, walls, doors, and buildings. The use of these materials and their size, shape, and placement creates a series of stimuli which can permit or not permit certain forms of learning behavior. The architect has not been aware and has not fully measured the effects of these complex physical stimuli. The effect of space upon an activity can be readily seen in the following example.

An individual is invited to a painting class at Buckingham Palace. He arrives in the proper attire for a visit to Her Majesty's quarters: top hat and tails. Ushered into a large hall with a magnificent Victorian balustrade and chandelier, he perceives a pure white rug on the floor. There is an easel covered with satin and ermine. Given a pallet of ten cans of oil paint and a four-inch brush and a four by eight foot canvas, he is told to paint. All the requirements for the creation of a Jackson Pollock seem to be present. But the individual is loathe to drop paint on Her Majesty's floor or onto his suit. The environment restrains the person's behavior, because he is aware of the cultural and economic consequences of what is called 'soiling' or 'spoiling.' Given the same equipment with dungarees and an old loft with an old wooden pine floor, one could expect different behaviors; for the consequences are different. However, it is not only the environment that is acting in this case. The two situations can be reinforced differentially. (1) Offer $5,000 reward to the participant and enough funds to replace all the paint damages done in Buckingham Palace. Have Her Majesty assure the participant that this is for the benefit of the people of Great Britain. (2) Impose a fine of $10,000 for every spot of paint dropped on the old pine floor. These new contingencies would reverse the behavior of the participant in these two spaces. This is the power of the reinforcer.

The architect, at times, thinks he holds all the environmental controls and carefully redesigns a community that was once slum. He replaces it with well-planned spaces of great beauty, function, and economic wisdom. But he may find people still urinating in the corners and writing four-letter Anglo-Saxon words in bold type on each exposed wall. At other times, the architect arranges the space so that the social behaviors are supposed to be maintained by its proper use; for example, a Mies Van der Rohe-like anonymous box.

It is necessary to examine both ends of the architectural and behavioral spectrum if one is really planning to get involved in the environmental design business.

Environmental Analysis

All behavior is lawful. In addition, it can be asserted that all behaviors have consequences, and the quality, quantity, and the timing of the consequences maintain or extinguish behavior.

For example, we are taught that a red traffic light means 'stop', and a green traffic light means 'go'. This symbolic piece of visual communication holds true for the pedestrian as well as the driver, although the nature of the consequences may differ. If the pedestrian crosses with repeated success when the light is red, the probability that he will again cross on a red light is governed by the effect of the immediate consequences. This getting across the street without waiting for the green light is time saved. This time saved will then act as a positive reinforcer maintaining his crossing the street at red lights. Consequently, he will increase crossing the street at the red light because he has reached the other side safely and has saved his time. If he were hit by a car when he stepped off the sidewalk during a red light, the results would be painful and immediate. This consequence would discourage further red light violations.

Our vehicular and pedestrian society is based upon the knowledge that people's driving and walking behaviors are maintained by consequences within the parameter of that activity. The go on green and stop on red is not the entire chain of procedures. A chimp can be taught to stop on red and go on green, but unless all other discriminating stimuli responses are scheduled in as well, he is likely to go on green even though there is a parked car in front of him.

We know that each physical product says something. A chair says, 'sit'. A bar across the chair, or a sign saying, 'ten dollar fine for sitting on this chair', or a sign of 'wet paint', does not encourage sitting.

The ability for the individual to sit on the chair (the demonstration of a sitting behavior) is directly dependent upon two aspects of the condition: (1) the physical object, chair, and (2) the contingencies that maintain or restrict the behavior (the bar, the fine, the destruction of the clothing by wet paint). The contingencies govern the behavior of the one who wishes to sit on the physical object chair.

It is not just the tool itself (the physical product), whether it be a building, a group of buildings, a chair, a laboratory table, a film, a book--that maintains a complex behavior of learning, but the nature and the extent of the consequences. There are cases wherein the architectural condition does define and limit the use of its facility. A glass or marble wall clearly states, 'You cannot put a thumb tack in me.' On the other hand, a paperboard or celotex wall says, 'Yes you can.' However, the physical conditions--the walls, ceilings, floors, chairs, and tables--in combination with the moving chain in the environment--the teachers, students, books and supplies--are a complex interaction maintained for the most part by the frequency and the extent of the reinforcers: the rewards, the immediate or long range goals.

Environmental Design

The projects listed below will be discussed in terms of three major functions: (1) individual learning environments, (2) group learning environments, and (3) group leisure:

• The Department of Design Project	Southern Illinois University
• The Experimental Freshman Year	Southern Illinois University
• The CASE I Project	National Training School for Boys, Washington, D.C.
• The CASE II Project	National Training School for Boys, Washington, D.C.
• The Programming Interpersonal Curricula for Adolescents (PICA) Project	The Washington, D.C. Environs.

To understand the approach taken, the CASE II floor plans and activity descriptions and the PICA floor plans and activity descriptions are hereby included.

A General Introduction to Both Program Designs

Every research project concerning human behavior is supported by a complex environment. The environment is made up of the selected subjects, the staff and administration, the physical space controls, and the operating payoff system. In order to determine what is maintaining a behavior, an examination of the total ecology that surrounds the project must be undertaken and a project designed to measure and deal with the variables that it presupposes as effective. Also, the research methodology must include an objective means of gathering the information needed, in order to determine whether the goals of the research are being carried out.

To design a research project with human subjects that will produce objectifiable data is no small assignment. Because man is not merely a chemical and a physiological specimen, there has been a tendency for most researchers to reject the isolated laboratory research approach and to turn towards the control group systems generally employed by educators and social scientists everywhere.

The basic premise of any human research project should be that behavior is functionally related to its consequences, and that by setting up an ecology in which appropriate consequences are made contingent upon changing

behavioral requirements, these behaviors can be established, altered, maintained, and transferred. Although the setting may be a penal institution, a mental institution, a halfway house, a court system, a school, a center, or the street, research objectives should be clearly spelled out and goals kept to a minimum.

The CASE II Project, National Training School for Boys

Seven project functions were used as points of departure for the development of the actual procedures employed during the CASE II project: the student office, the lecture hall/laboratory, the private sleeping room, the cafeteria, the lounge, the library, and the store.

In order to study, a student requires light, privacy from visual and physical interruption, books, paper, a surface to write upon, and a place to sit. The office fulfilled the following objectives: The office with the student's name on the wall provided a sense of personal privacy and pride, as well as an area of staff control. It provided an isolated environment wherein beginning study behaviors were programmed. It also provided a place for special teaching machine scheduling. The student could use it as a center for communication between himself and his teachers and he could store some of his textual and three-dimensional school materials there. It was a place where visual controls were added and removed, where disciplines relevant to reading, writing, and coordination of information were controlled. The space was used as a reinforcer--a rental piece of property worth a required amount (90 per cent or better performance) of basic academic behaviors. Less than this prescribed performance meant the loss of a student's right to have an office. It was a basic tool in helping the student learn self-discipline.

Educational activities are generally filled with behaviors requiring different stimuli (books, films, materials, space, teacher, other students) in particular temporal and spatial arrangements. Some activities require two people (oral reading, a speaker and a listener); some require more than two (a group needed to fulfill a complex physics lab experiment). There are also some activities in which an increase in quantity of human beings does not basically detract from a learning activity (a lecture, a lecture demonstration, a film) and therefore can be scheduled successfully in groups. The lecture hall/laboratory was often combined in this demonstration project to take advantage of all known uses of group learning and group reinforcement. The environment was programmed for film, tapes, slides, and live lectures and was subsequently scheduled so as to act differentially for the variety of subject matter to be taught in the curriculum.

The way in which the student organized and maintained his private living-sleeping quarters and the visual images he selected to decorate it were used to measure a variety of things; in particular, cultural change. The schedule for work or leisure in his own space--its use and the friends he permitted to visit in his space--became another means of measuring social change. Regulations governing visiting other rooms were maintained and a time schedule for floor use permitted ample control.

The availability of a variety of foods in the cafeteria allowed the student to choose again. By raising or lowering prices, quantities, and methods of

display, the staff introduced many new foods to students. Names of foods and language usage were further reinforced by wall signs and daily menus. Special Sunday and Saturday evening dinners with family or special visitors were used to teach table manners and socially useful behaviors normal to a semiformal eating situation; for example, proper clothing, general grooming, conversation, and table etiquette.

The word "lounge" connotes enjoyment--a nonacademic reinforcement, the place where one goes to dance, listen to teenage music, talk about "regular stuff," and get away from school. The lounge remained a teen town setup, but slowly other kinds of music, activities, and visuals were introduced into the environment. Through successive approximation, the lounge was reshaped to act as a reinforcer for the academic and vocational behaviors as well as the acceptable social behaviors.

The establishment of the library adjacent to the actual lounge permitted the staff to shape up alternatives to playing the jukebox, cards, and so on. By using the fading procedures used in CASE I, CASE II increased the students' use of the library for reading newspapers, magazines, and books; here they could also play games that helped reinforce decision and problem-solving behaviors which were introduced in the programmed educational work week.

The store, through carefully selected purchasing and by recording types, quantity and time of purchase, became the arbiter of taste and the cultural change agency. By creating "sales" and a means of displaying items for immediate availability, the store was able to provide the stimulus for a way of life.

The Federal Bureau of Prisons provided the project with elemental services and facilities. The major contribution was Jefferson Hall, an unused, four-story, fireproof structure which had previously housed approximately one hundred inmates. It was one of the newest buildings on the grounds (though several decades old) and was found to be quite suitable for the project environmental requirements. Considerable planning was required, however, to redesign the existing space into a unit which would accommodate all functions of the project.

Each of the four floors housed a semi-autonomous program function. This general plan allowed for the most advantageous utilization of existing facilities and provided for the student control necessary in this penal situation. The ground floor of Jefferson Hall (Figure 1) contained the thirty specially-constructed sleeping rooms (Area A), each six by eight feet. Area B was used for the minimum rental (relief status) sleeping and storage facility. Bunks and wall lockers were provided for the students who did not wish to rent private rooms. Area C was used for a nighttime cottage officer control station. Area D was furnished as a lavatory and provided lockable storage units for personal hygiene articles. Area E was the communal shower. Each shower was provided with an individual faucet control. Private lockable shower stalls and a bathtub were installed as shown on the outside wall. Area F was used for a linen and bed clothing storage and distribution center. Area G was the stairwell and hallway leading to the first floor. It could be isolated from the sleeping quarters by the lockable door which separated the two areas.

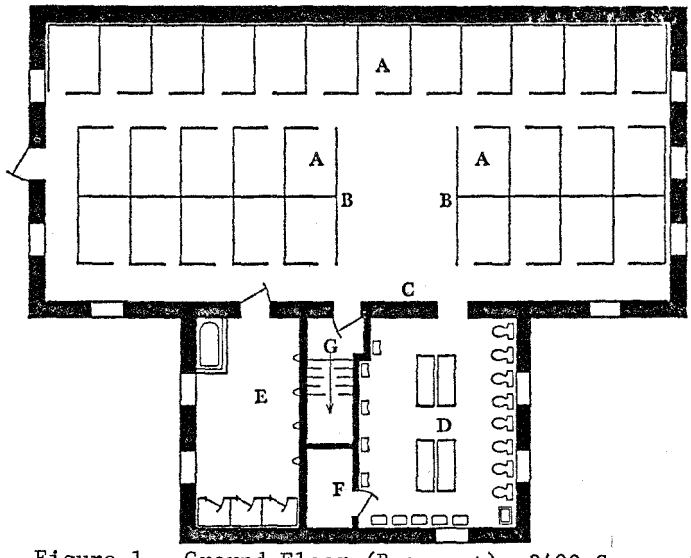

Figure 1. Ground Floor (Basement), 3400 Square Feet.

The first floor of Jefferson Hall (Figure 2) contained the dining facility, the purchasing and recreation area, and research staff offices. Area A was the planning staff office. It provided private space for the associate project director and the nighttime research assistant. Area B was the principal investigator's office and conference room. The C areas were for supportive staff and also data control work stations. This included work areas

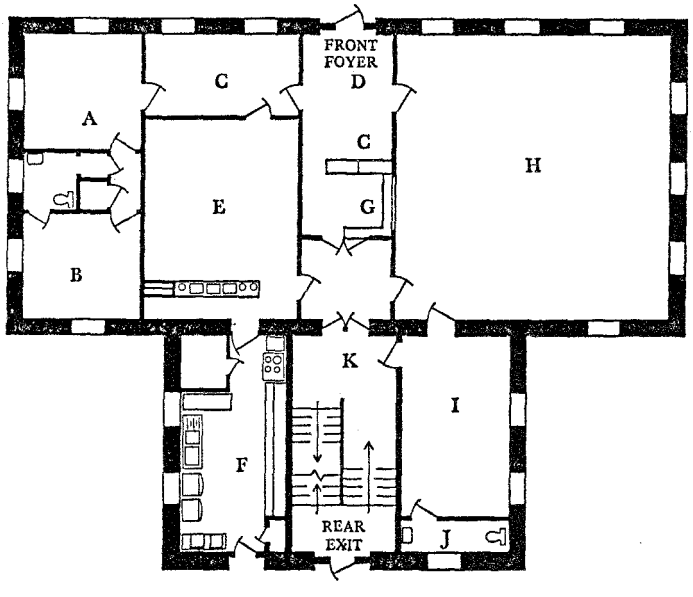

Figure 2. First Floor, 3400 Square Feet.

for one secretary/receptionist, one typist/bookkeeper, and two data control analysts. Area D was a waiting room for visitors. Area E was employed alternately as a dining hall, movie hall, coffee break room, and television room. The counter top shown in this area was provided by the food service contractor and housed steam tables and other relevant food dispensing equipment. Area F was the kitchen. It was provided with a pantry, utensil storage, stainless steel counter tops, and a wash sink; an institutional size refrigerator, range, and dishwasher were also included. The entire room was under the direct control of the food service manager, supervised by the CASE II dietetic consultant and the CASE II staff. This kitchen had a separate outside entrance to ensure hygienic food handling and a non-disruptive means of entrance to and exit from this floor.

Area G, the store, served as the major control center for the student-oriented operations of this floor. Area H was the lounge, or recreation center. The doorway between the lounge and the antechamber facing the store was outfitted with a turnstile to facilitate control over lounge entrance. The library in Area I provided space for reading and quiet leisure games and activities, such as chess and scrabble. (Later this area became a TV room and the library was moved to the educational floor.) The front door of the library remained closed except for emergencies. The side door was the only entrance. Area J was the lavatory facility for this floor.

The second floor of Jefferson Hall (Figure 3) was utilized for most of the educational activities that were provided within the CASE II Project. Area A was used for an auditorium and lecture hall. It was outfitted with standard student desks. The flexible divider partitioned this six hundred square foot auditorium into two smaller classrooms. (The smaller section became the library area part way through the program.) Area B was the

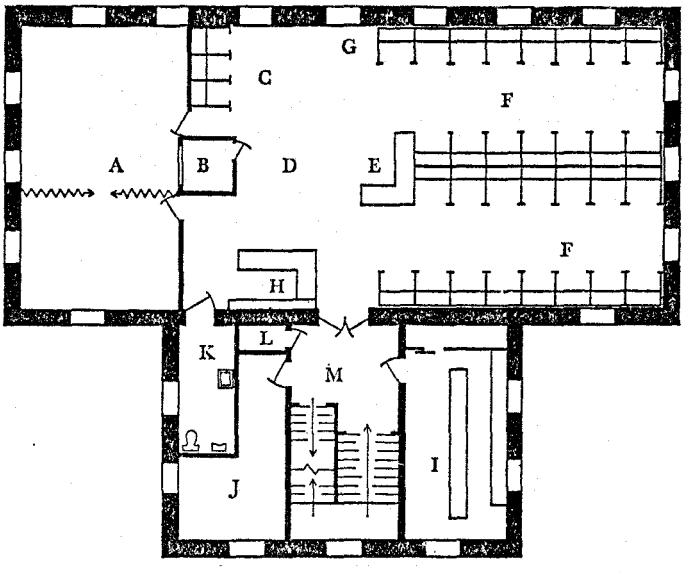

Figure 3. Second Floor, 3400 Square Feet.

components found in and throughout U.S. industry: the work station where the employee performs his daily tasks, an environment for those staff members engaged in the inspection of completed tasks, specially controlled rooms for the production of critical assembled (behavioral) components, office spaces and meeting rooms for the managerial staff that set production standards and oversee production quality, and recreational and leisure areas for the workers.

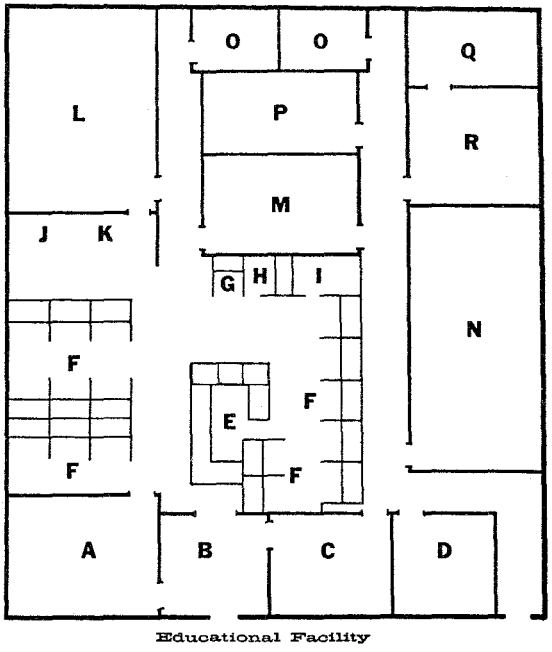

Figure 4. Floor Plan of Facility Housing the PICA Project.

A - Coordinator's office
B - Receptionist
C - Staff office
D - Staff office
E - Educational program checking and review
F - Study carrels
G - Automated testing
H - Automated learning center
I - Programming controls
J - Teacher station
K - Typist and storekeeper
L - Lounge
M - Educational programming
N - Classroom and laboratory
O - Bathrooms
P - Storage
Q - Experimental Laboratory (not for student use)
R - Experimental Laboratory (not for student use)

Continuous minor renovations to this facility helped develop the space controls required in an effective self-instructional study area, a lounge, staff offices, classroom space, and experimental laboratories.

Study Facilities - The design of the PICA Project was predicated on the assumption that the majority of learning behaviors that take place would be managed through the self-instructional curriculum developed in previous research efforts. Therefore, the largest single area of space in the Educational Facility was assigned to the installation of 16 private student study carrels, the educational program-checking and review area, automated and non-automated testing stations, a special automated learning center, an audio-visual control room, and minimal facilities for a teacher's desk and a desk for a typist and storekeeper. Each of the study components built into this larger space was constructed of sound and visual controlling panels, as used in the previous CASE II research project. Each study carrel was constructed as a four foot by four foot module, with a two-foot by four foot desk-surface. Each carrel was equipped with a non-glare, flicker-free, double fluorescent fixture. A straightback study chair was provided for each booth. The program-checking and review station was constructed as a two foot, two-way desk top, where students could interact with educational program managers. Also, a series of three testing booths were installed at one end of the program-checking and review station. Filing systems, sufficient to store all programmed instructional study units and related equipment, were installed as under-the-table support units in the program-checking area. The automated testing booth was constructed of the same panels used in the study carrels. The major difference between this and the study carrels lay in the student-controlled instrumentation provided with it (described later). The automated learning center and the audio-visual control room were also constructed of the same materials used for the study carrels.

The area provided for the teacher was originally planned as a source of immediate student referral. It was designed to be used minimally throughout the student day, but had to be readily accessible to the student. The desk assigned to the typist/storekeeper was positioned next to the lounge door to ensure a degree of supervision over the lounge activities.

The Lounge - The lounge facility itself contained leisure furniture, a paperback "lending" library, soda and candy-dispensing machines, posters and art materials selected for the teenage worker, a dining table and chairs where students could eat their lunch before returning to school, and minimal kitchen facilities where the students could store their "brown bag" lunches and select from a number of hot beverages. The lounge was to function both as a student and PICA staff area. Two bathrooms and a water fountain were also available in the facility.

The Classroom - The concept of the academic and interpersonal classroom, as applied to this learning situation, was distinctly different from that found in most traditional schools. First, this classroom was to be used for both student-parent interviews and for the classroom activities scheduled in the project. It was designed to incorporate two desks for the principal investigators who would use the room as a teaching laboratory, a large cocktail-type table, and padded leather swivel chairs, a credenza for storage of educational material, and a large conference table to be used for formal meetings and student seminars. This classroom did, however, have to fulfill one other unique function. Because of planned components of the classroom activities, this room would be used initially as a "free-swinging" atmosphere, where students would be permitted to

behave in a manner which would elicit maximum participation. Thereafter, the space was to be gradually shaped into a more traditional classroom setting. By changing the visual and physical cues, and coupling these with procedural changes, the room becomes effective in teaching more appropriate classroom behaviors for those students who have no such repertoire.

Eventually, the two rooms set aside for experimental laboratories and the one room established as a storage facility will be converted into science laboratories for student use in coordination with the programmed-instructional curriculum and classroom activities. During the first months of the project, these spaces were used for experimental behavioral studies with animals and as PICA staff training laboratories.

Implications for Environmental Design Methods, Research and Education

> To look to the future, one does not seek the answer in Genesis, crystal balls and soothsayers, but one may understand "whither we are tending" by examining the behavior of the organism man today. We must examine not what he says he does, but indeed what he does do.

Throughout history, the designer has been concerned with developing extensions of man: tools which would assist him in his continuing problem of survival. From the finding of caves to the building of skyscrapers, there is an evolutionary development in form and material--not in basic concept. Man's basic need for shelter gave birth to over 3,000 years of architectural themes and variations unsurpassed even in music. Man the designer has been involved in the task of reshaping his external conditions to suit his needs much longer than 3,000 years. The developments from an open fire to a heating plant and from a leaf fan to air conditioning are technological developments triggered by need and by man's ingenious use of his biosphere (the physical resources of his earth).

The major original problem was to keep him cool relative to his own internal thermal condition. Man's temperature of 98.6 degrees probably has not varied more than a minor fraction of a degree in millions of years. But the products which were developed to maintain this internal equilibrium through the range of comfort and to the security of life itself have been enormous. When men were tired, they sat down. To the north, the ground was cold, consequently, they sat higher. To the south, the ground was warmer, so they sat closer to it. The development of the Western chair and of sitting 16-to-18 inches off the base plane was the product of the first, and the sitting on rugs and cushions in the Orient was a product of the second. Whether one sits on an Eames chair, a Duncan-Phyfe couch, a bench, a three-legged stool or a rug, a pillow, or the grass itself, one's behavior falls under the category of sitting.

In general, the designer of today has continued to take the role of product extension design. The catalogs and products in the department stores are witness to the proliferation of "goodgets" and "gadgets," home furnishings, etc. Another group of men have involved themselves in the planning of the larger products, the shelters. The buildings, and their aggregation, the city, have been growing on an enormous scale. Furthermore, the problem eventually involves reshaping the landscape itself. In general, these

two categories, product extension and environmental control, can be classified under the broad category of design through the use of the biosphere (the manipulation of nature's earth stockpile to solve biophysical and socio-economic problems). In essence, this manipulation has been going on since man first chopped a tool out of flint and blew ochre on the cave walls.

In past history, man developed his physical extensions, his tools, through a process of successive approximations. For example, the development of the flint spear was a function of its use. Those flints which were well attached and well sharpened and found their mark in the prey became more usable. The badly designed and fabricated tools were not used. The process was simple. Those that used poorly designed tools did not return from the jungle battlefield, while the others with equal hunting or soldier skill did. This selection and development of the design of tools and the supportive technology was one that was shaped gradually through time/use. Man did not get from the spear to the rifle in a short jump. But just as the spear was a result of the available technology and the knowledge of the day, so was the gun a result of the available technology of its day and the result of its knowledge. The education of the young must surely have followed similarly.

Up to the time of recorded history, we can do little more than guess at the procedure. With the development of the written language, we are able to examine the recorded behaviors of civilization from Mesopotamia, Egypt, Greece, Rome, and into the Orient and western civilization. It was through this recording of events that man has been able to evolute from a mud and twig builder to a glass, plastic, and steel builder, from a hurler of stone projectiles to a hurler of interplanetary missiles. The written record of the experiment avoided repetition of the same learning in the new generation. In brief, the education of man has followed very closely the development of man's physical extensions.

At this stage of our development we have reached the ability to design our own materials. We now take from the biosphere chemical elements and recompose them atomically rather than in shape and form. In the past, man reshaped the flint and cut down the twig and manipulated the vine to make a spear. Today man composes new elements out of the available chemistry to form materials whose chemical combinations are not found lying on the earth or in it. Today he does not seek and mine complex materials; he writes specifications. He lists those physical behaviors that he ultimately requires for the task and sets about to create them in the laboratory.

In the bible, God saw all that He created, "and it was good," and He rested. Unlike God, the environmental designer cannot rest. Unlike the statements in Genesis where God is one and omnipotent, there is required a large new group of competent professionals who will join together with the architects, behavioral scientists, medical men, lawyers, etc., and set as their terminal objective the design of environments which will support learning and life styles that progress towards the public health. The operational procedures and pilot studies will require the design of many new behavioral and physical extensions. But unlike the design and architectural products of the past, these new extensions must be in direct fulfillment of measured human

behaviors rather than "airy fairy" hypotheses explored, stated as gospel fact, and mutually admired and reconfirmed at "in-cocktail parties," architectural magazines, design journals, graphics magazines, and the professional societies whose role is to foster and maintain their own past position.

The realization for this requirement--for a new group of competent environmental designers--is quite frightening. I do not believe that the present design schools and the universities of today have produced enough generalized men who would feel secure enough and competent enough to step out of the narrow band of the old professional concept of architectural design. In some sense, this presentation is meant to point out this deficiency and to encourage the participation in the design of human environments of those who are competent problem-solvers who are at present generally not listed as professional designers (psychologists, psychiatrists, sociologists, lawyers, economists, etc.).

Although the ultimate goal, a perfect man in an earthbound Garden of Eden--an environment in total harmony--is neither desirable nor attainable, it is a point of reference; a particle of light by which we may set out sextants, plot the course, and begin our journey. To that goal, I solicit your participation.

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