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Adoption of Energy Efficient Design
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ADOPTION OF ENERGY EFFICIENT DESIGN BY MICHIGAN CHAPTER OF AMERICAN SOCIETY OF INTERIOR DESIGNERS

By

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ABSTRACT

This research tested Everett Rogers' adoption of innovation process for individual decision making. Rogers' theory specifies four stages in the course of adopting an innovation. These four stages, (1) awareness, (2) interest, (3) evaluation, and (4) adoption were used as the dependent variables of the experimental design. The sample was divided into two groups, the control group and the experimental group, and were used in addition to demographic variables as the independent variables. The sample tested was the membership of the Michigan Chapter of American Society of Interior Designers. The quasi-experimental research followed a non-randomized control group, pretest-posttest design.

Of the four null hypotheses stated (testing for a difference in means between the control group and experimental group), the awareness, evaluation and adoption hypotheses were not rejcted, whereas the interest hypothesis was rejected. Therefore, Rogers' theory was not supported as articulated but indicated some support for Rogers' restated theory of the four stages occurring simultaneously.

This research gave more support to the interior designer's willingness to adopt the innovation than to the actual implementation and adoption of the innovation.

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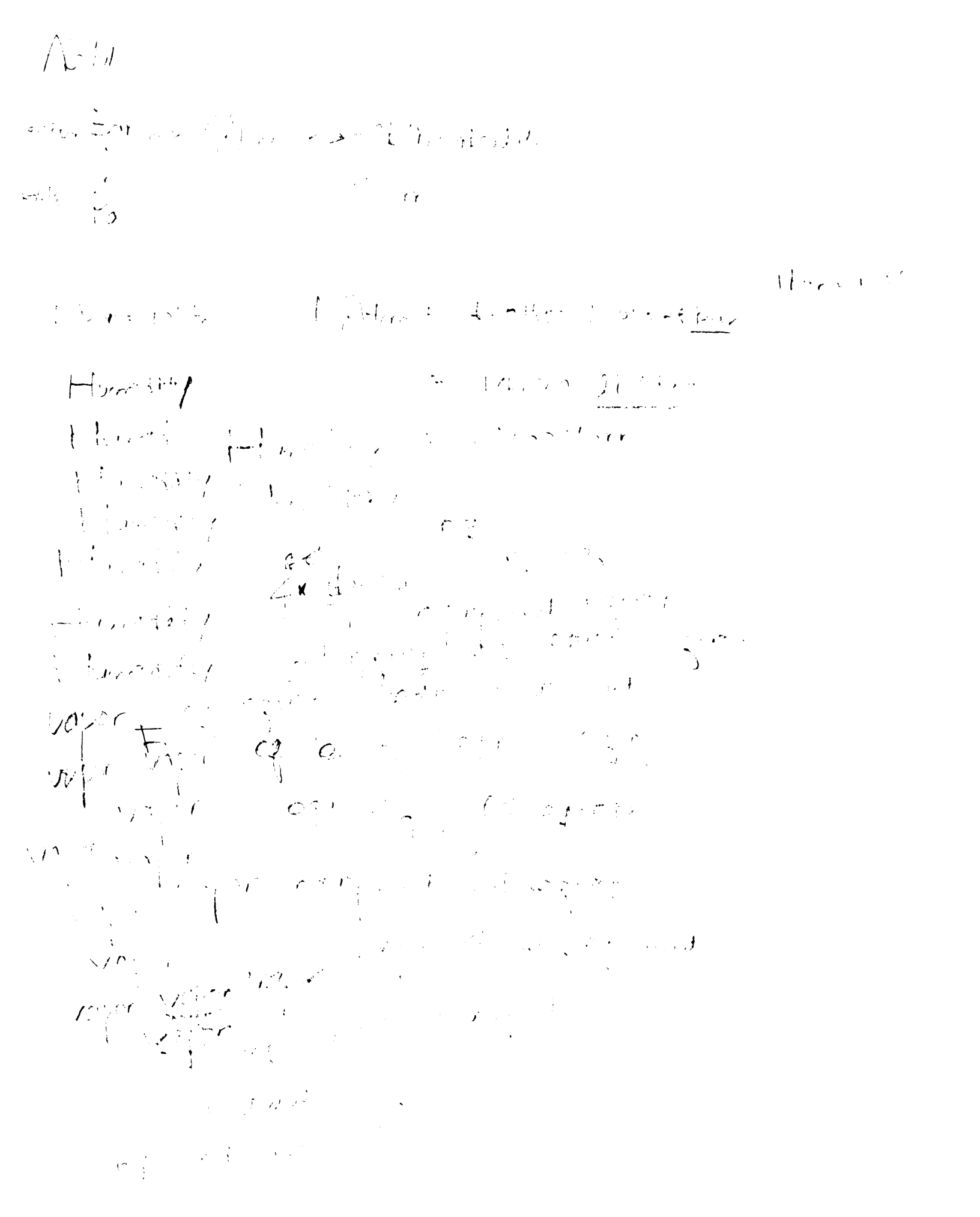

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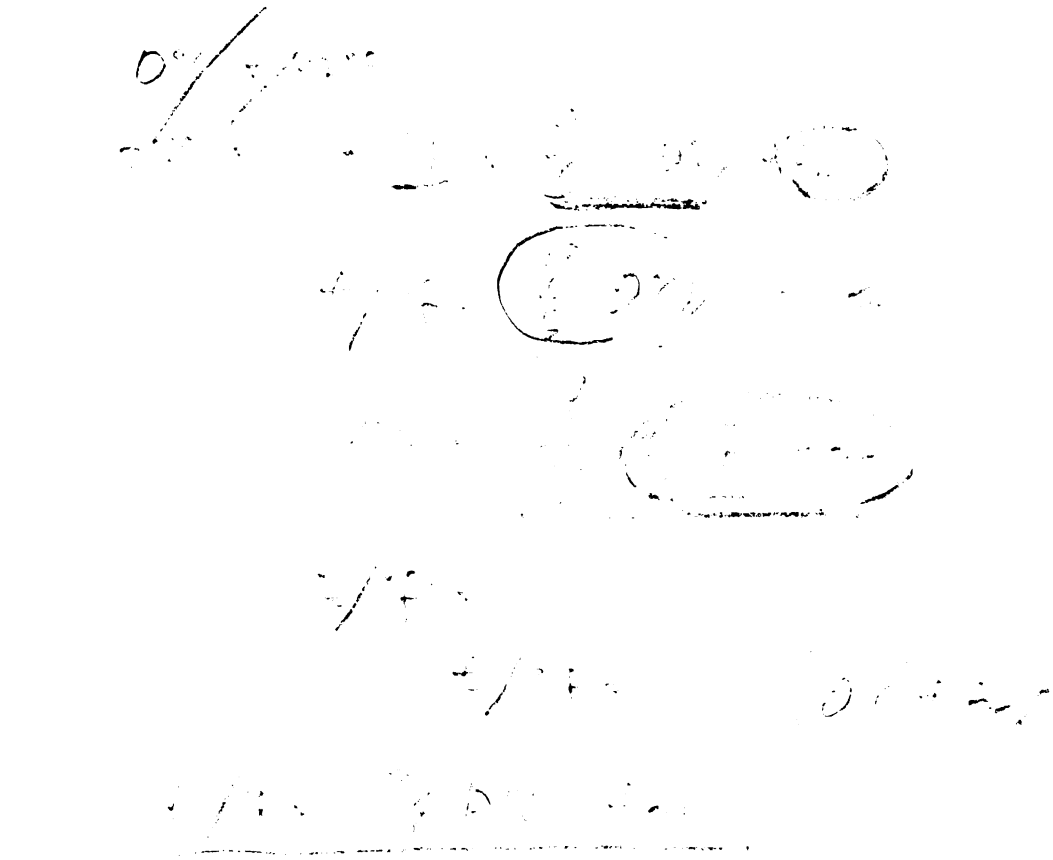
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INTRODUCTION

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INTRODUCTION

JUSTIFICATION

With the advent of the 'energy crisis' (Arab oil embargo, October 1973), government officials, scientists, and researchers have been concerned with how to reduce energy consumption, particularly of petroleum fossil fuels. Numerous technical devices and adaptations in buildings and equipment, as well as behavioral changes, have been identified as methods to reduce energy use. Education in energy conserving techniques has been urged on all consumers; residential, commercial, and industrial. Many studies have been done to evaluate energy conservation. To date, no empirical data has been obtained to evaluate the knowledge in and the use of energy conserving design techniques by the interior designer. Is it not timely and appropriate for the design professionals, those who create the buildings and interiors, to affirm their concern and status in developing energy conserving design? Interior designers have always been innovators of aesthetic as well as functional solutions for interior environmental problems. As creative professionals, designers have a new responsibility; to consider energy as a new element in design, equal to the traditional elements of space, form, shape, line, texture and color.

Richard G. Stein, author of Architecture and Energy, summarizes the strategy of implementing rational energy conserving design on a self-determining basis.

> "The cost of not doing it (conserving energy through rational design) is so huge and so tragic that in one way or another these changes will have to come about. If they come as the result of governmental decrees or of the imposition of controls under stringent police direction, the outcome may be an anticipated reduction in the use of the earth's resources, but the quality and content of life might be diminished irretrievably. And yet, if these changes are embraced and adopted as the correction of the suicidal course we embarked upon a couple of decades back, it could reintroduce a dimension to life that is rapidly being eliminated. The basis for optimism is rooted in the conviction that design is the act of intelligence applied to the allocation of existing resources." (STEIN, 1977)

THEORY OF ADOPTION OF INNOVATION

Effective communication is essential in a program as far reaching as the diffusion of energy conserving design techniques. Since the topic being research here introduces a new idea about design to a specific social system, interior designers, it is necessary to explore a particular type of communication, the diffusion of innovation.

The whole realm of research and development in the diffusion of innovation, is a crtiical one when considering the future role of the professional design organization in our society. John Gardner (1965) in his book Self Renewal, suggests that constant innovation is necessary if organizations are to survive. This same problem is discussed when

Alvin Toffler (1970) in Future Shock, relates his concerns about social systems and social system members being unable to adapt to the rapidly changing world around them. His suggestions of flexibility and ability to adapt new ideas to environmental problems provide significance for research into the innovation processes in a social system.

Diffusion of innovation is a current and useful means of studying the introduction of new ideas and methods in particularized social systems. It is thought that through the introduction of new ideas and practices a social system can effectively be changed or improved. Research efforts in diffusion processes are abundant in quantity and diversified in areas of emphasis. These will be discussed in the review of literature chapter.

The particular theory to be used in this research evaluating the interior designer's individual decision-making process is Everett Rogers' diffusion of innovation theory. He defines an innovation as "an idea, practice, or object perceived as new by an individual" (Rogers, 1962). This idea does not necessarily have to be brand new, it may have been around for some time, but the individual receiver has not yet made a decision concerning its adoption or rejection. The purpose of introducing an innovation is to explore the change that takes place among members of a social system during the period of diffusion of the innovation. The specific innovation this research examined was energy conserving solar energy design techniques. The cooperation of the Michigan Chapter of the Amercian Society of Interior Designers, (hereafter MASID) an organization of professional in-

terior designers, was sought and granted for the introduction of the innovation conceived and made explicit by this research. The receivers of the innovation were the membership of the MASID.

Many researchers (Bell-1962, King-1964, Simpson-1959) have indicated that the theory underlying the diffusion process is a valid method of communicating new ideas to members of an organization. Indeed, Rogers defines diffusion as "the process by which new ideas are communicated to the members of a social system" (Rogers, 1962). The basic elements of the diffusion of new ideas are given by Rogers as follows: (1) the innovation, (2) which is communicated through certain channels, (3) over time, (4) among members of a social system.

Each of these elements in the diffusion process has basic characteristics that define each area more precisely. The innovation has already been defined as a new idea. The next element, communication of the innovation through certain channels, was implemented through an oral presentation of the innovation to members of the receiver group. The presentation of the innovation necessarily must take place between a source and receiver group similar in characteristics. For this particular research problem, the source was a practicing professional interior designer, and the receiver group was the organization of professional interior designers, MASID. Thus the source and the receiver have similar professional underpinnings, status, and attributes.

The third element in the diffusion process is the factor of time. Time is an important consideration in the diffusion process and involves the introduction of the innovation-decision process. The time element as it was used in the study will be examined in detail later. The fourth and final element in the diffusion process is the notion of the innovation occuring among members of a social system. Rogers defines a social system as "a collectivity of units which are functionally differentiated and engaged in joint problem solving with respect to a common goal" (Rogers, 1962). The receiver group, MASID, functioned as the social system within the analysis.

As previously stated, the third element, time, includes the innovation-decision process. The introduction of the innovation-decision process gives the four variables to be analyzed in this research. The innovation-decision process is the mental process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject, and to confirmation of this decision. This process should be distinguished from the diffusion process. The major difference between the two processes is that diffusion occurs among the units in a social system, whereas innovation-decision making takes place within the mind of an individual. Examined within this framework are the four stages of Rogers' innovation-decision process, (1) awareness, (2) interest, (3) evaluation, and (4) adoption. Rogers' model of the innovation-decision process actually includes a fifth step, trial, between evaluation and adoption. For the purposes of this study, trial has been eliminated, as Rogers does in a later revision of his theory. The primary reason for eliminating trial in this study was because of the relative short time the research spanned.

OPERATIONALIZED VARIABLES

The four stages, awareness, interest, evaluation, and adoption, become the dependent variables of the study and will be defined as stages of the decision-making process interior designers go through in the adoption of innovative energy efficient interior design techniques. These are defined as follows:

1. Awareness: the individual learns of the existence of the new idea but lacks information about it. The point where one gains information and becomes aware of needs. The professional interior designer is hypothesized to become aware of the energy problem and its importance for the designed environment through: (1) awareness of the energy problem, and (2) belief in the energy crisis. These were the two items used to measure awareness.
2. Interest: the individual develops interest in the innovation and seeks additional information about it. The professional interior designer is hypothesized to become interested in energy conserving design elements through two items which measure the following: (1) interest in providing a solution, and (2) a sense of responsibility to make environments energy efficient.
3. Evaluation: the individual makes mental application of the new ideas to the present and anticipated future situation and decides whether or not to try it. The professional interior designer is hypothesized to evaluate alternative solutions available to design energy conserving solar interiors and decides to try or reject them. This is measured by the following items: (1) evaluation of the innovation, (2) knowledge of energy efficiency, and (3) knowledge of energy conserving solar design.

4. Adoption: the individual uses the new ideas continuously on a full scale. The interior designer is hypothesized to adopt the new design ethic of energy efficiency and is measured by these items: (1) adoption of innovation, and (2) willingness to adopt energy efficiency as a design ethic.

The end product is to achieve the adoption of the innovation through an individual, decision-making process, through an organized, step-by-step procedure that can be measured and evaluated at each stage.

Using Rogers' diffusion of innovation theory as a basis for empirical research on an interior design professional organization as an innovative social system, allows the gathering of evidence as to a system's capacity to change and improve. The problem of this research study thus becomes acquiring empirical evidence to support the theoretical structure for the process of individual decision making as put forth by Everett Rogers in the adoption of innovation through the diffusion of innovation.

STATEMENT OF THE RESEARCH PROBLEM

The study is designed to indicate the extent to which the diffusion of an idea about energy conserving solar design occured amongst a social system (MASID), and further, to indicate what extent that idea has become a part of the individual member's decision-making process toward the adoption and implementation of energy efficient design.

As a result of this problem, two specific concerns were examined: (1) the evaluation of the interior designer's knowledge of energy efficient, specifically solar design, techniques, and (2) the evaluation of the interior designer's stated support to adopt energy efficient design as a new design ethic.

DISCURSIVE DEFINITIONS:

Alternative Energy Sources: renewable energy sources, not petroleum based; wind, hydro, solar nuclear, geo-thermal, etc.

Conduction: heat transfer directly through a material

Convection: heat transfer created by the motion of air or water resulting from a difference in temperature and the action of gravity

Design Ethic: a standard of conduct by which a professional interior designer governs his/her practice

Energy: a measure of the ability or power to do work

Energy Efficient Design: using various techniques and methods to design a building to reduce the mechanical energy load for heating and cooling

Fossil Fuels: non-renewable energy sources, the most frequently used are coal, oil and natural gas

Interior Environment: the living/working space within an enclosure

Mechanical Solar Energy: a solar system requiring pumps or fans to move fluids, an active system

Passive Solar System: a solar system using direct sunlight for an energy source, maximizing orientation, siting, architectural features, window treatments and materials

Professional Interior Designer: one who is qualified by education and experience to identify, research and creatively solve problems relative to the function and quality of man's proximate environment

HYPOTHESES:

H_o1: There is no difference between the means of the control group and experimental group in awareness of the energy problem.

H_o2: There is no difference between the means of the control group and experimental group in interest in providing a solution to the energy problem.

H_o3: There is no difference between the means of the control group and experimental group in evaluation of the innovation.

Sub H_o3: There is no difference between the means in evaluation of the innovation between education levels of the control group and the treatment group.

H_o4: There is no difference between the means of the control group and experimental group in adoption of the innovation.

OBJECTIVES:

1. To test the viability of Rogers' adoption of innovation theory in relation to energy and design.

2. To test a difference between the control group and treatment group in relation to awareness, interest, evaluation and adoption.

SPECIFICALLY:

3. To test the professional interior designer's awareness of the energy problem.

4. To test the professional interior designer's interest in providing a solution to the energy problem by learning more about energy efficient design techniques.

5. To test the professional interior designer's evaluation of energy efficient and solar design.

6. To test the professional interior designer's willingness to adopt energy efficient design techniques.

ASSUMPTIONS:

1. The professional interior designer's role is that of an innovator of traditional design concepts, and therefore is assumed to be innovative in new concepts (energy efficiency concepts).

2. The interior designer answered the questionnaire on energy and design truthfully and to the best of his/her ability.

3. The mailed questionnaire is a valid method of obtaining information from a sample of respondents in an experimental design.

4. The adoption of the innovation is by definition desirable.

5. The American Society of Interior Designers is a social system as defined in Rogers' model.

CHAPTER II

REVIEW OF LITERATURE

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REVIEW OF LITERATURE

DIFFUSION OF INNOVATION

The topic of this research involves the communication of a new idea to members of a social system. The specific form of communication examined is the diffusion of innovation process. Katz, et al. (1963) define diffusion as acceptance, over time, of some specific idea or practice by an individual, linked by specific channels of communication to a social structure, and to a given system of values or culture. Rogers states that diffusion is a special type of communication by which innovations (ideas perceived as new) are spread to the members of the social system. Diffusion includes the basic components of the communication process, plus focusing on the entire process from the first knowledge of the new idea to the actual behavior change accompanying an adaptation of the new idea (Rogers, 1971).

Diffusion has been studies in various kinds of research traditions. Although the theoretical explanation is based on a common process, the topics are different as are the specific variables.

The rural sociological approach to studying diffusion of agricultural innovations is best represented by the Ryan and Gross study (1943) of hybrid seed corn. Lionberger's study (1949) of informal communication patterns in communities, Wilkening's studies (1949) of social psychological variables, and Colemen's study (1946) of sociometric data

on soil conservation all support Rogers' innovation theory. They also provided the fundamental data for the significant summarizing document on diffusion of innovation by Rogers (1962).

The major contribution to the studying of educational innovations has come from the Columbia University Teacher's College since the late 1920's. The effort was originally guided by Mort and best summarized by Ross (1958). Adaptability of schools to new practices is the central theme in most of the studies. Other efforts include R. Carlson's study (1965) of adoption of educational innovations and J. Coleman's study (1961) of school climates.

The diffusion of medical drugs was first studied by Caplow (1954). A series of systematic investigations in drug use was made by the Columbia University's Bureau of Applied Social Research under the leadership of Katz, Menzel and J. Coleman (1954).

The communication approach to the study of news diffusion and dissemination problems includes research by Deutschmann and Danielson (1960) of four major news events. Deutschmann and Borda (1962) researched adoption patterns in a village of a developing country. Further communication research was the study of diffusion of news of the Kennedy assassination (Greenberg and Parker, 1964).

Dissemination of scientific information is another approach to studying innovation diffusion. Centers to study the optimal process of dissemination of scientific information to practitioners and fellow scientists have been established at the University of the State of New York (Center on Innovation in Education), University of Michigan (Center for Research on the Utilization of Scientific Knowledge), and Stanford University (Institute for Communication Research), among other academic institutions.

The spatial diffusion study is an approach first taken by Hagerstrand (1952, 1960) to study population immigration and spread of agricultural products in Sweden. This approach has become closely associated with machine simulation of innovation diffusion through the works of Karlson (1958), Pitts (1962), and Deutschmann (1962).

A unifying effort to summarize and conceptualize the findings in the diversified areas of subject matters of diffusion was made by Rogers (1962), Stanford University. It is, to date, the best documentation of empirical evidence of diffusion research.

From the above evidence, it can be seen that the diffusion of innovation theory should be an appropriate theoretical framework for investigating the communication of energy efficient design techniques. Four basis elements are essential parts of the diffusion of new ideas and practices. These elements are: (1) the innovation, (2) communicated through channels, (3) over time, and (4) to members of a social system (Rogers, 1976). Each of these elements have

been discussed theoretically in Chapter I. Their relationship to the adoption of innovation energy conserving solar energy design will now be examined.

1. THE INNOVATION

Energy conserving passive solar design techniques will be introduced as the innovation to the members of a social system.

There is some disagreement among researchers as to whether knowledge or perceived need comes first. Tarde (Rogers, 1971) says "Since the desire for, cannot precede the notion of, an object, no desire can be prior to the invention." Taking this one step further, one could postulate that a person becomes aware of an innovation quite by accident, as one cannot actively seek out an idea not known to them. Hassinger (1959) takes the opposite view in that he feels knowledge seeking is initiated by the individual. It is an active process. Due to the selective exposure tendencies in people, they will, consciously or unconsciously, expose themselves to those ideas in accord with their needs, interests or existing attitudes. They will seldom expose themselves to a message unless they have first felt a need for the innovation. He proposes that unless the person has a felt need and perceives the innovation as relative to this need, he will not attend to it and it will be of little effect. Rogers summarizes these viewpoints as, "The need for innovations such as a pesticide to treat a new crop pest, proably comes first. But for other new ideas the innovation may create the need (Rogers, 1962)." Needs in

this framework concern reduction of energy consumption in buildings. These can either be felt first, causing designers to seek knowledge; or can be aroused by general knowledge of the new idea being present in the culture.

2. COMMUNICATED THROUGH CHANNELS

This is the point where the research on the effectiveness of different levels and types of information, feedback and methods of presentation becomes important. Existing knowledge of the effectiveness of mass media channels versus interpersonal channels is important in understanding how information becomes communicated.

It has been found that communication flows in organizations are usually horizontal, that is, between individuals of equal status (Simpson, 1959). One of the fundamental principles of human communication is that the exchange of messages most frequently occur between a source and a receiver who are alike, or homophilous (Rogers, 1973). Homophily is defined as the degree to which a source-receiver pair is similar in certain attributes, like beliefs, education and social status. Heterophily is the exact opposite. One of the distinctive problems in communication is that the source is usually quite heterophilous to the receiver. They simply do not talk the same language. However, when source and receiver are identical regarding their technical grasp of the innovation, no diffusion can occur. Therefore, the very nature of diffusion demands that at least some degree of heterophily be present between source and receiver.

There is research evidence that the most effective change agents are those who are most like their average client on all variables except for technical compentence about the innovation (Rogers, 1973). For maximum communication effectiveness, a source and a receiver should be homophilous on certain variables and heterophilous on some variables relevant to the innovation. One reason given by Berscheik (1966) and Brock (1965) for the greater communication effectiveness of homophilous sources is that such homophily leads to greater credibility (the degree to which a source is perceived as trustworthy and competent). The greater the credibility of the source, the greater is the confidence of the receiver in the apparent need of the innovation.

Fear appeals, similar in nature to ones used for changing health behaviors might be of some use. Haas, Bagley and Rogers (1975) studied the differences in attitudes to change energy behavior among people reading fear based information about energy supply. They found stronger intentions to change behavior among those who had read the fear appeal. Education is based on the idea that change in intention and attitudes will result in a similar change in behavior (Bennett and Kassarjian, 1972).

3. OVER TIME

Time is one of the most important considerations in the process of diffusion. The time dimension is involved in (1) the innovation-decision process by which an individual passes from first knowledge of the innovation through its adoption or rejection, (2) the innovativeness of the indi-

vidual, that is, the relative earliness-lateness with which an individual adopts an innovation when compared to other members of his social system, and (3) in the innovation's rate of adoption, the relative speed with which an innovation is adopted by the members of a social system.

1. Innovation-Decision Process

The innovation-decision process is described as a mental process moving through a number of steps. It is important to note that this is mental, and therefore not easy to observe or even to be sure of an individual's place in the process.

Rogers (1962) gives the sequence in the innovation-decision process as :

Awareness———— Interest———— Evaluation———— Adoption.

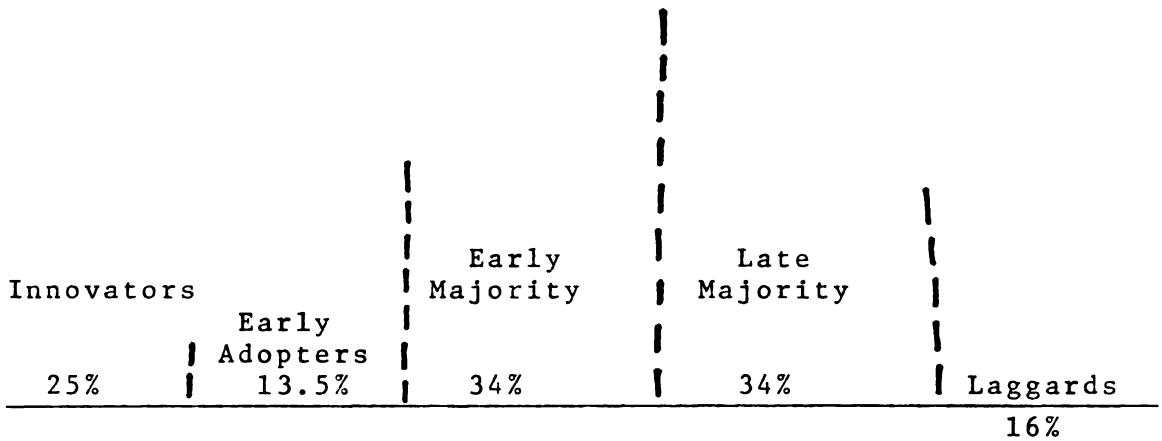
As stated earlier, these four steps will become the dependent variables of this research.

2. Innovativeness of the Individual/Adopter Categories

Innovativeness is the degree to which an individual is relatively earlier in adopting new ideas than other members of his system. Adopter categories are the classifications of the members of a social system on the basis of innovativeness. The five adopter categories are: (1) innovator, (2) early adopter, (3) early majority, (4) late majority, and (5) laggards.

A continuum of individual innovativeness is divided into the five categories and appears thus: (Rogers, 1971, pg. 182)

Adopter Categorization on the Basis of Innovativeness



Generalizations about the categories are stated, based on observations abstracted from various studies. Using Rogers' generalizations, dominant values are given as: innovators-venturesome; early adopters-respectable; early majority-deliberate; late majority-skeptical; and laggards-traditional. The measure of innovativeness and the classification of the system's members into adopter categories are based upon the relative time at which an innovation is adopted.

3. Rate of Adoption

Rate of adoption is measured for an innovation or a system, rather than for an individual. Five characteristics of an innovation or new practice have been identified as explain-

ing the rate of adoption. (Rogers, 1971)

(1) Relative Advantage is the degree to which an innovation is perceived to be better than the old. When this is seen as positive, adoption is more likely to occur. Energy efficiency's increased advantage was reinforced through the energy crisis situation.

(2) Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of the receivers. This insures greater safety with less risk to the receivers. It is also the basis for one small change in actions paving the way for another and possibly a larger change. If the small change is tried and fails then a reverse direction towards nonadoption can be the result. Behavioral changes, related to changes in life-style and quality of life, might be more difficult to encourage people to adopt. More successful diffusion might occur with structural or built-in energy saving devices that would not conflict too much with existing values and life-style.

(3) Complexity refers to the ease or difficulty of understanding and use with which the idea is perceived. A higher rate of adoption could result from simplifying the energy efficiency techniques to one or two practices, such as energy efficient window treatments, use of passive solar energy, etc.

(4) Trialibility is the degree to which an innovation may be experimented with on a limited basis. This could include both a trial of actions and a psychological trial. This cuts down the risk by allowing one to proceed in small, successful increments toward the full adoption. Trial and positive results of energy conserving techniques would encourage people to continue to try more practices or adopt them permanently.

(5) Observability is the degree to which the results of an innovation are visible to others. The more easily observed successes of the new idea, the more readily others are adopted. Publicity of successful reduction of energy consumption could be used to improve the visability of buildings meeting a certain standard of energy efficiency.

Rogers (1971) cites research proving that over time the adoption of an innovation will increase. As more and more people adopt, the diffusion effect, which is an increasing degree of influence upon the individual to adopt, comes into play. As more people adopt, the rate of adoption of the social system increases.

4. MEMBERS OF A SOCIAL SYSTEM

The last element, social system members, focuses on the idea that each individual who should adopt an innovation is greatly influenced by his social peer group. An important factor affecting the adoption of any innovation is its compatibility with the cultural beliefs of the social system. If social norms do not support or approve the new practice, it will be a long and difficult process to change behaviors. The majority of people will only continue behaviors which are reinforced or rewarded by social norms and customs. The difficulty in energy conservation lies in identifying the complex factors that reward energy consumptive behaviors and those that reward energy conservation behaviors. (Hannold and Nelson, 1976)

ENERGY CONSERVATION ADOPTION

Studied generally, energy conservation practices have been the topics of several pieces of research. Diffusion of energy information research has focused on how to educate and motivate American consumers to adopt energy saving behavior. Several research surveys have asked people across the country what energy saving responses they have made to the energy problem. In a national survey taken in March, 1974, Talarzyk and Omura reported that over 50 of the sample said they made the same number of shopping trips and drove the same number of miles as before the energy crisis. Bartell (1974) found that seventy percent of a Los Angeles County sample cut down on recreational automobile driving and forty percent skipped vacation trips. Ninety-three percent reported that they tried to turn off lights when not needed. In a study in the Lansing, Michigan area, Morrison, Keith and Zuiches (1976) reported that sixty-five percent of their sample stated that they kept their thermostat at 68 degrees or less in the winter, ninety-six percent reported turning off lights when not in use, and eighty-five percent covered or sealed windows and doors with storm windows or plastic. Perlman and Warren (1975) conducted a survey in Hartford, Connecticut; Mobile, Alabama; and Salem, Oregon. Sixty-seven percent of the sample reported that they reduced driving for shopping and recreational purposes and forty-three percent of the households closed off rooms to conserve heat.

Recent experimental research studies have attempted to test various educational campaigns which might successfully reduce energy consumption in households. One of the first studies

was conducted by Thomas Heberlein (1975) in Madison, Wisconsin in March and April, 1973. In 1974, Kohlenberg, Philips and Proctor (1976) studies the use of incentives and information feedback to reduce electrical use during peak hours. Studies by Hayes, Cone and Palmer, Lloyd and Lloyd (1975) indicate that people will reduce electricity consumption by as much as eighteen percent receiving feedback that tells them how much energy they are using and how much it would cost if they continue to use it at the same rate. Winett and Nietzel (1975) compared the use of information and monetary incentives for reducing energy consumption in 31 volunteer households. And finally, in a study by Seaver and Patterson (1976), they presented feedback to a group of homeowners that expressed the amount of fuel oil that their homes consumed relative to the same time period the year before.

Given findings such as these, further investigation into the relationship of diffusion of energy efficiency information and the adoption of an energy innovation, seems necessary.

CHAPTER III

METHODOLGY

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METHODOLOGY

SURVEY RESEARCH METHOD

"Survey research utilizes a variety of instruments and methods to study relationships, effects of treatments, longitudinal changes, and comparisons between groups", (Isaac and Michael, 1971). That information is then used to describe systematically the facts and characteristics of a given population or area of interest, to collect detailed factual information that describes an existing phenomena, to identify a problem area and to make comparisons and evaluation between two or more variables. The survey or questionnaire method was used in this research in order to obtain consistency and quantifiable information.

A self-administered mailed questionnaire was designed to elicit information from the basic unit of study, the interior designer, MASID member. The use of a self-administered mailed questionnaire is an efficient way to collect data on a large number of variables as the subject can respond more freely and openly as to the extent of her/his knowledge of the problem area than in an interview situation.

PROCEDURE

This research focuses on the collection and analysis of empirical data in order to obtain information to assist in

identifying a specific problem area; knowledge of and the effects of the energy problem on the practices of the professional interior designer.

The research procedure is based on a quasi-experimental design with descriptive underpinnings. It is defined as quasi-experimental because it lacks one characteristic of a true experimental design; a completely randomized sample. The reasons for this will be discussed later.

This quasi-experimental research follows a non-randomized control-group, pretest-posttest design, set up in the pattern shown below.

	PRETEST	TREATMENT	POSTTEST
EXPERIMENTAL GROUP	Q_1	X	Q_2
CONTROL GROUP	Q_1		Q_2
POSTTEST ONLY			Q_2

This design investigates the possible cause and effect relationships by exposing one experimental group to one treatment condition and comparing the results to one control group not receiving the treatment. Possible effects of the pretest are controlled for by also providing a group who received the posttest only.

The pretest was a mailed, self-administered questionnaire submitted to the entire population; the Michigan Chapter of American Society of Interior Designers (MASID). This was mailed in May 1977. The treatment was a lecture/slide presentation given to those self-selected subjects of the

population that attended the June 1977 MASID meeting held in East Lansing, Michigan. The presentation was given by this researcher and Dr. Cerwyn Kline of Lansing Community College. (See text in Appendix.) The posttest was a mailed, self-administered questionnaire submitted to the entire MASID population in November 1977.

SAMPLED POPULATION (n=312)

The American Society of Interior Designers is the world's largest association representing the profession of interior design. As a professional society, it is dedicated to serve the entire profession and to maintain the highest possible standards for the practice of interior design.

Its professional membership includes designers in both contract and residential design. These include designers in private practice, design consultants, designers employed by major corporations or architectural firms, and designers employed by furniture and department stores. The philosophy of the Society is that the greater needs of the professional can best be served by one strong organization, and its programming is directed toward these many specialized groups within its membership.

The Michigan Chapter, the sampled population, is a state member of the national organization.

SELECTION OF THE SAMPLE

The questionnaires were mailed to all members of the population, MASID. The sample thus became a non-random, self-selected sub-set of the population who responded to the questionnaires. Since the subjects of the sample are all members of MASID, the group members are as similar as availability permits. This will be controlled for by comparison of pretest means.

Other types of control were used for internal validity. Control for self-selection of the sample was achieved by comparing the demo-graphic data of the sample with the population data available from MASID, to be certain the sample was representative of the entire population. Also, the subjects of the sample may be self-selected but are not volunteers. They did not volunteer to come to the treatment. Finally, the experimental group and control group were from the same population.

Experimental Group: Those members of MASID who responded to pretest and posttest questionnaire and received the treatment by attending the June 1977 meeting.

Control Group: Those members of MASID who responded to pretest and posttest questionnaires and did not receive the treatment by attending the June 1977 meeting.

TABLE 1: DESCRIPTION OF THE SAMPLE

Group	Number of Cases
Population	312
Responded to pretest questionnaire	79
Responded to posttest questionnaire	69
Responded to pretest and posttest questionnaire	36
Experimental group	19
Control Group	17
Responded to posttest questionnaire only	25

To increase the size of the sample, the entire population was sent both questionnaires with the respondents then being placed into groups.

With a total population of 312, the response to the pretest questionnaire was twenty-five percent and the response to the posttest questionnaire was twenty-two percent. The control group consisted of five percent of the population and forty-seven percent of the sample who responded to both questionnaires. The experimental group consisted of six percent of the population and fifty-three percent of the sample who responded to both questionnaires.

TABLE 2: MEMBERSHIP STATUS

Status	Population	%	Experimental	%	Control	%
Professional	183	59	8	42	6	35
Associate	114	37	11	58	11	65
Educational	10	4	0		0	
TOTAL	312	100	19	100	17	100

Both the experimental and control groups have a similar number of subjects from the two most populated status levels, thus making each group representative of the other. It is interesting to note that a higher percentage of associate members responded to the questionnaire, and no educational members.

TABLE 3: AGE

	Population	Experimental	%	Control	%
20-29	na	9	47	1	6
30-39	na	6	32	6	35
40-49	na	0		6	35
50-59	na	4	21	2	12
60-69	na	0		2	12
over 70	na	0		0	
TOTAL		19	100	17	100

Population data on this variable was not available for this research. It would appear the experimental group has somewhat younger subjects, with seventy-nine percent under the age of 40. The control group has a majority of subjects, seventy percent between the ages of 30 and 50.

TABLE 4: SEX

	Population	%	Experimental	%	Control	%
Female	197	63	10	53	9	53
Male	115	37	9	47	8	47
TOTAL	312	100	19	100	17	100

The sex variable is evenly distributed between the control and experimental groups, each have fifty-three percent female respondents and forty-seven percent male respondents. This distribution differs slightly but still points in the same direction as the population, which is sixty-three percent female and thirty-seven percent male.

TABLE 5: HIGHEST EDUCATION LEVEL

	Population	Experimental	%	Control	%
High School	na	---	--	---	--
Professional or technical	na	---	--	2	12
College work/no degree	na	3	16	5	29
Bachelor's degree	na	9	47	7	41
Graduate work/no degree	na	4	21	1	6
Graduate degree	na	3	16	2	12
TOTAL		19	100	17	100

All subjects have more than a high school education, with a minimum of technical or professional training. Eighty-four percent of the experimental group has a bachelor's degree or higher. The control group shows fifty-nine percent with a bachelor's degree or higher. Both groups show highly educated subjects, with the distribution between groups quite similar.

TABLE 6: INCOME-ANNUAL

	Population	Experimental	%	Control	%
$1000-$4999	na	0		0	
$5000-$9999	na	0		2	12
$10000-$14999	na	5	26	2	12
$15000-$19999	na	2	10	3	18
$20000-$24999	na	3	16	1	5
$25000-over	na	6	32	7	41
Missing data		3	16	2	12
TOTAL		19	100	17	100

Over fifty percent of each group is in an income level of $20,000 plus. The distribution appears similar between the experimental and control groups, with the majority of each earning over $20,000 per year.

COLLECTION OF THE DATA

Prior to distribution of the questionnaire, there was a need to establish that the professional group of interior designers had the information needed for the research. To achieve that, ten interior designers, consisting of eight professionals and two educators, were pilot tested. These ten interior designers were professionals from outside the MASID population. That pilot test was then analyzed to determine bias, ambiguities, other responses to be included in the questionnaire and which methods of analysis would be most appropriate.

Upon completion of any corrections the pretest questionnaire was mailed to the MASID along with a letter of introduction.

The letter of introduction (see Appendix), gave the purpose of the research, the end-use of the results, provided credibility for the researcher by being identified as a professional, associated the research with Michigan State University and stressed the value of the information gained from individual responses. This letter also explained the coding process of the questionnaire so the subject was assured of the anonymity of her/his response. A similar letter was sent with the November 1977 questionnaire (see Appendix), with the same objectives in mind. A follow-up letter (see Appendix) was mailed in January 1978 to increase response.

PROCESSING THE DATA

After the completed questionnaires were returned to the researcher (the pretest questionnaire prior to the June 1977 treatment and the posttest questionnaire by March 1978), the data were checked for completeness of the responses. The raw data were then transferred to coding sheets by a team of coders. The key punching and verification were done by the Michigan State University keypunch office of the Computer Center. After the cards were returned to the researcher, they were further verified against the raw data and found to be extremely accurate.

ANALYSIS OF DATA

For the purposes of this research, it was necessary to recode the original data from the questionnaires. The following operational definitions focus on the ways the original data were transformed in order to be used in the analysis of the data for this research.

OPERATIONAL DEFINITIONS

Dependent Variables: (See Appendix B for specific questions)
(I) Awareness of the Energy Problem: (1) belief in the energy crisis
(II) Interest in Providing a Solution to the Energy Problem: (1) sense of responsibility to make environment energy efficient, (2) willingness to incorporate design innovations using solar energy
(III) Evaluation of the Innovation: (1) knowledge of solar design techniques
(IV) Adoption of the Innovation: (1) willingness to adopt energy efficiency as a design ethic, (2) use of energy conserving techniques, (3) considering prevention of heat loss when designing window treatments, and (4) willingness to use sun resistant textiles.

Independent Variables:
No recoding occurred with the independent variables as they are easily understood demographic descriptors.
(I) Membership Status in ASID
(II) Years worked as an interior designer
(III) Hours worked per week as an interior designer (both in the studio and out of the studio)
(IV) Number of designers on the staff of the studio where employed
(V) Population of service area
(VI) Highest educational level
(VII) Sex
(VIII) Age
(IX) Income
(X) Experimental Group
(XI) Control Group

STATISTICAL ANALYSIS

Analysis was done by means of CDC 6500 computer using the Statistical Package for the Social Sciences program.

The statistical analysis of this research design was carried out to see the relationship between an independent dichotomized variable, the control and experimental group, and a dependent variable, awareness, interest, evaluation or adoption.

In order to determine if a difference existed between the control group and the experimental group, the t-test was used. This statistic allows a test of the null hypothesis that there is no significant difference between the sample means of the control group and the experimental group, particularly appropriate for small samples.

Because of the high educational level, an analysis of variance was also run between the experimental and control groups with the variable evaluation with education level used as a covariate.

Frequencies were also used to determine the response characteristics of the sample. The frequency tables are shown on the following pages and are used to support conclusions and implications in the summary.

TABLE 7: FREQUENCY OF RESPONSE FOR VARIABLE AWARENESS			
Group	Response	Pretest	Posttest
Control	Yes	88.2%	86.7%
	No	11.8%	13.3%
Experimental	Yes	78.9%	73.7%
	No	21.1%	26.3%
Posttest Only	Yes	---	66.7%
	No	---	33.3%

TABLE 8: FREQUENCY OF RESPONSE FOR VARIABLE INTEREST			
Group	Response	Pretest	Posttest
Control	Definite Interest	82.1%	94.1%
	Indication of Interest	17.6%	5.9%
	No Interest	---	---
Experimental	Definite Interest	78.9%	84.2%
	Indication of Interest	21.1%	15.8%
	No Interest	---	---
Posttest Only	Definite Interest	---	87.5%
	Indication of Interest	---	12.5%
	No Interest	---	---

TABLE 9: FREQUENCY OF RESPONSE FOR VARIABLE EVALUATION

Group	Response	Pretest	Posttest
Control	Complete Knowledge	5.9%	5.9%
	Some Knowledge	35.3%	29.4%
	Very Little Knowledge	11.8%	5.9%
	No Knowledge Stated	5.9%	5.9%
	Incorrect Knowledge	---	---
	No Answer Given	41.2%	52.9%
Experimental	Complete Knowledge	10.5%	31.6%
	Some Knowledge	21.1%	21.1%
	Very Little Knowledge	36.8%	---
	No Knowledge Stated	5.3%	10.5%
	Incorrect Knowledge	---	---
	No Answer Given	26.3%	36.8%
Posttest Only	Complete Knowledge	---	8.0%
	Some Knowledge	---	4.0%
	Very Little Knowledge	---	4.0%
	No Knowledge Stated	---	12.0%
	Incorrect Knowledge	---	---
	No Answer Given	---	72.0%

TABLE 10: FREQUENCY OF RESPONSE FOR VARIABLE ADOPTION			
Group	Response	Pretest	Posttest
Control	Willing to Adopt	81.3%	87.5%
	Not Willing to Adopt	12.5%	6.3%
	Indication of Willingness	6.5%	6.3%
Experimental	Willing to Adopt	76.5%	66.7%
	Not Willing to Adopt	17.6%	22.2%
	Indication of Willingness	5.9%	11.1%
Posttest Only	Willing to Adopt	---	77.3%
	Not Willing to Adopt	---	13.6%
	Indication of Willingness	---	9.1%

CHAPTER IV

ANALYSIS OF DATA

CHAPTER IV
ANALYSIS OF DATA

FINDINGS AND DISCUSSION

This chapter contains the results of the analysis of the data. For each hypothesis, the results of the statistical tests are reported and followed by discussion of the findings. Conclusions and implications will be found in the next chapter.

Each dependent variable was analyzed for both pretest and posttest mean scores of the control and experimental groups. By testing for level of significance of pretest mean scores, a control was provided for any significance that may be found in the posttest mean score. That is, if the mean scores of the two independent variables, control and experimental groups, showed no significant difference in a dependent variable, and there was a significant difference in a dependent variable, the difference can be attributed to the treatment received by the experimental group.

The significance level for each hypothesis was set at .10. The primary rational for setting this level of significance so high was because the diffusion and innovation of energy efficient design techniques had not been researched. By providing a broader range for the data to support or not support the hypothesis, the probability was increased for the data to show significance. Thus increasing the chances of disclosing trends which could be important to further research.

Hypothesis I: There is no difference between the means of the control group and experimental group in awareness of the energy problem.
Significance level: .10

The findings are shown in Table 11.

TABLE 11: T-TEST RESULTS FOR VARIABLE AWARENESS

	Number of cases	Mean	Percent change	Significance level
Control Group Pretest	17	1.1176	8%	p=.356
Experimental Group Pretest	19	1.2105		
Control Group Posttest	17	1.133	10%	p=.344
Experimental Group Posttest	19	1.2632		

DISCUSSION:
There was no significant level of difference between the means of the control and experimental groups. The null hypothesis was not rejected.

The means of the pretest and posttest were very similar between both groups, with only 8% and 10% change shown. There was 75 percent overall belief in the energy shortage by both groups as shown by the frequency of responses in

Table 7. However, it can be seen there was only 66 percent awareness for the posttest only scores of frequency. It would appear the pretest questionnaire may have had an effect on the posttest scores, but the treatment had very little effect on the posttest scores.

Hypothesis II: There is no difference between the means of the control group and experimental group in interest in providing a solution to the energy problem.
Significance level: .10

The findings are shown in Table 12.

TABLE 12: T-TEST RESULTS FOR VARIABLE INTEREST

	Number of cases	Mean	Percent change	Significance level
Control Group Pretest	17	1.3529	5%	p=.803
Experimental Group Pretest	19	1.4211		
Control Group Posttest	17	1.1176	15%	p=.087
Experimental Group Posttest	19	1.3158		

DISCUSSION:

In comparing the pretest means of the control and experimental group, the mean of the experimental group was higher than the control group by 5 percent, with a significance level of p=.803. The very little difference in mean scores between the two groups indicated the similarity of the interest level.

When comparing the posttest mean scores, the mean of the experimental group was higher than the control group by 15 percent, with a significance level of p=.087. This fell within the .10 level of significance set for rejecting or not rejecting the hypothesis, which indicated a significant difference in interest levels between the control and experimental group. The higher mean was coded to reflect a higher interest level. Since the experimental group mean score was higher than the control group, it showed the significant difference was not sampling error but may be due to the treatment. Therefore, the null hypothesis was rejected.

Frequency Table 8 shows an extremely high level of interest in providing a solution, over 84 percent for all posttest scores, with no responses for the no interest category. The posttest only group was consistent with the other two groups, showing it was a control for the Hawthorne effect.

Hypothesis III: There is no difference between the means of the control group and experimental group in evaluation of the innovation.

Significance level: .10

The findings are shown in Table 13.

TABLE 13: T-TEST RESULTS FOR VARIABLE EVALUATION

	Number of cases	Mean	Percent change	Significance level
Control Group Pretest	17	3.7059	12%	p=.652
Experimental Group Pretest	19	4.2105		
Control Group Posttest	17	3.8235	24%	p=.761
Experimental Group Posttest	19	2.8947		

PLEASE NOTE: A decrease in the mean score is actually a positive increase in knowledge since the arbitrarily assigned coded integers indicate a lower raw score for more complete knowledge.

DISCUSSION:

In comparison of the mean of the control and experimental group, pretest scores, the mean of the experimental group was higher by 12 percent, with a significance level of p=.652. No significant difference between the two means showed the similarity of the two groups on the variable evaluation of the innovation.

The posttest means of the control and experimental group showed the experimental group mean 24 percent lower than the control group, with a significance level of p=.761. No level of significant difference was indicated so the hypothesis was not rejected. There was a 31 percent higher mean score between the pretest experimental group and the posttest experimental group. This indicated the treatment did have some effect on the level of knowledge increase, although not significant in a T-Test. However, an analysis of variance was done on this variable with education level as a covariate. It showed a .087 level of significance which would lead to rejection of a sub hypothesis: There is no difference between the means in evaluation of the innovation between education levels of the control group and the treatment group at the .10 level of significance.

Frequency Table 9 shows the posttest only group with a low level of knowledge, 72 percent not even giving a response to these questions. The frequency of response in each category specified somewhat less knowledge for the posttest only group than the control group. It could be inferred from this that the pretest questionnaire acted as a treatment for the control group. However, there was a 12 percent overall decrease in knowledge for the control group from pretest to posttest response which contradicted the effect of the pretest questionnaire or the Hawthorne effect.

Hypothesis IV: There is no difference between the means of the control group and experimental group in adoption of the innovation.
Significance level: .10

The findings are shown in Table 14.

TABLE 14: T-TEST RESULTS FOR VARIABLE ADOPTION

	Number of cases	Mean	Percent change	Significance level
Control Group Pretest	17	1.1765	2%	p=.756
Experimental Group Pretest	19	1.1579		
Control Group Posttest	17	1.1176	18%	p=.345
Experimental Group Posttest	19	1.3684		

DISCUSSION:
In comparing the pretest means of the control and experimental group, the mean of the experimental group was lower than the control group by 2 percent, with a significance level of p=.756. This showed a very similar pretest comparison and indicates a similarity of adoption between the two groups.

The means of the control and experimental posttest scores showed the experimental mean higher by 18 percent, with a significance level of p=.345. Again no significant difference existed, the null hypothesis was not rejected. However, there was a 15 percent increase in the mean score between the pretest experimental group and the posttest experimental group. The higher mean was coded to reflect an increased willingness to adopt. This could indicate a slight increase in the willingness to adopt the innovation after receiving the treatment.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

CHAPTER V
OVERVIEW OF THE RESEARCH PROBLEM

Well designed interior environments have always been the goal of the interior designer. In the past, "well designed" has meant functional and aesthetically pleasing. But function has seldom included energy efficiency as a primary factor. Today, with the documented energy problem, well designed buildings should be both energy efficient and aesthetically pleasing. Buildings and their interiors can be designed with full consciousness of energy and its attendant constraints or they can be designed with little regard for energy efficiency. There is a great potential for energy conservation which can be offered by the professional interior designer. They can help create a solution for the energy problem, without loss of design quality.

A major concern of this research has been to evaluate the interior designer's knowledge of the energy problem and its alternative solutions. Rogers' diffusion of innovation theory was the underlying framework by which this evaluation occurred. Rogers' theory introduced the process, adoption of an innovation. In particular, energy conserving solar design techniques were introduced to a social system, Michigan Chapter of American Society of Interior Designers and provided a method of indicating the extent to which the innovation, energy efficient design, has been considered for adoption and possible implementation by the individual members of MASID. Rogers' innovative-decision process was used to evaluate the interior designers' present knowledge

of energy efficient design concepts and their stated support to adopt energy efficiency as a new design ethic.

The four stages of the individual innovative-decision process were used as the four dependent variables analyzed in this research. These were operationalized as: (1) awareness, (2) interest, (3) evaluation and, (4) adoption. These dependent variables were defined as the stages of the decision-making process interior designers pass through toward the adoption of innovative energy efficient interior design techniques.

CHAPTER V
CONCLUSIONS

Hypothesis I: There is no difference between the means of the control group and experimental group in awareness of the energy problem.

Analytic

No significant difference was found between the means of the experimental and control groups on the awareness measures, therefore, the hypothesis was not rejected. Also, the frequencies showed no meaningful change from the pretest score to the posttest score in either the control or experimental group. (See Table 6). One explanation for this could be the fact that the interior designers are part of the larger population, public consumers. Members of both groups were educated consumers that may have been reached by public media, newspapers and television, which have focused some attention on the energy problem.

Speculative

Of primary importance in trying to explain difference from pretest to posttest scores is the frequency of response. In the pretest, over seventy-five percent of the sample believed there was an energy problem. (See Table 6). It is difficult to increase awareness of belief in a sample of this size with the awareness variable at such a high percentage of belief. Finally, interior designers are business oriented. Short supply of resources in industry affect their business. Designers would already be aware of the energy problem from a business viewpoint as well as a consumer point of view.

Hypothesis II: There is no difference between the means of the control group and experimental group in awareness of the energy problem.

Analytic

The analysis showed a significant increase in interest level of the experimental group over the control group, therefore, the null hypothesis was rejected.

Speculative

One possible conclusion for the increase in interest by the experimental group was the information gained in the treatment. The energy problem, perhaps was brought into clear perspective by the treatment (an energy presentation at an ASID meeting of June 8, 1977). The treatment, perhaps, raised the designer's interest from the consumer level to the professional and business level. The treatment was developed to help the designer understand ways to serve the client by increasing energy efficiency in the interior.

The treatment may have introduced, another professional and business concern, the marketability of an interior designer who is capable of creating energy efficient interiors. By providing this service, the interior designer could increase business and therefore their income. There was a possibility of a loss of income indicated if the designer did not move in this direction. And also, since the general public, and thus the client, is now more aware of the energy problem than previously, they will be demanding more energy efficient design. This will require more innovation from the designer.

By introducing the energy efficient design innovation and the methods of adopting this innovation, the treatment also suggested the role an interior designer could play in creating a solution to the energy problem.

Finally, the interest level could have been increased in the experimental group because the treatment stressed the non-technical aspects of solar design, therefore reducing intimidating technical information.

Hypothesis III: There is no difference between the means of the control group and experimental group in evaluation of the innovation.

Analytic

There was no significant difference in mean scores between the experimental and control groups on the evaluation measures, thus the hypothesis was not rejected. There was a meaningful but not significant increase from the pretest mean score to the posttest mean score of the experimental group. (See Table 9). It would appear that the treatment provided some new information about energy to the designer that helped increase the knowledge of energy efficient design, which was, if not statistically significant, at least meaningful.

Speculative

Even though interior design is an applied art, not a hard science, the increase in knowledge about energy efficient design showed the interior designer was not intimidated by the information needed to consider the innovation. The frequency scores showed a meaningful increase in the category 'complete knowledge' for the experimental posttest. (See

Table 9). Twenty-five percent more of the experimental group have knowledge of energy efficient design techniques after the treatment than the control group. Perhaps the time span between the treatment and posttest was sufficient to allow the designer to start to integrate the knowledge learned in the treatment with their design philosophy, if not their practice, in spite of the non-significant difference.

Hypothesis IV: There is no difference between the means of the control group and experimental group in adoption of the innovation.

Analytic

There was no significant difference between the means of the experimental and control groups on the measures of adoption, thus the hypothesis was not rejected. The small decrease in mean score from the experimental pretest to experimental posttest demonstrated the effect a small sample can have. The frequency scores showed only one subject changed from willing to adopt on pretest to not willing to adopt on posttest, yet it caused a ten percent decrease. (See Table 10). A larger sample would not have been so sensitive to an individual fluctuation.

Speculative

The slight decrease from the experimental pretest to experimental posttest came after familiarity with the innovation, that is, after the treatment. There are several possible explanations for this slight decrease. The innovation may have been irrelevant to a subject's business or practice, therefore creating a neutral or negative response. The

innovation could be too difficult or impractical for the available sources of a particular designer's practice, which brought a negative response. Finally, the decrease could relate to those subjects whose knowledge was incomplete, as shown in the previous hypotheses. These subjects could have been intimidated by their knowledge and, therefore gave a negative response to the second questionnaire.

In general, however, the frequency scores showed a high willingness to adopt the innovation which supports Rogers' theory. (See Table 10). A final question used to indicate the stated support by designers for energy efficiency was their belief that designers should adopt energy efficiency as a design ethic. In spite of the fact that there was no significant difference between the means of either group on pretest or posttest questionnaires, it can be concluded by the high frequency of response (ninety-seven percent of all respondents agreed, "that interior designers should adopt energy efficiency as a new design ethic,"), that there was strong support for an adoption of the innovation.

SUMMARY CONCLUSIONS

Analytic

The research did not find support for Rogers' theory of adoption of innovation. It appeared that the four stages were not passed through in a sequence process as he postulates. It was found the first two stages, awareness and interest, may coincide in the individual decision-making process.

The research did find support for placing the subjects of the sample into the adopter categories of individual innovativeness. The results showed the subjects would fall into the Early Majority category on the variable awareness, the Innovator category on the variable interest, the Late Majority category on the variable evaluation, and the Early Majority category for the variable adoption.

Speculative

Rogers' most recent theory about the adoption of innovation states that there is a probability of two or more of the stages happening simultaneously. (Rogers, 1971). The findings of this research tend to support this refinement of his theory.

The rate of adoption was slower on the evaluation and adoption variables because of the specific characteristics of the innovation (1) relative advantage, (2) compatibility, (3) complexity, (4) trialibility, and (5) observability. These characteristics are defined in Chapter II. The following specifically discusses these characteristics:

Awareness and Interest:

-showed an increased advantage which was reinforced by the energy crisis.
-was consistent with existing values.
-was easy to understand.
-was easy to mentally 'try on' for consideration.
-had an observable success rate shown by a comparative decrease in energy consumption of previous trials.

Evaluation and Adoption:

-needs of the receivers were not always readily apparent, however they were consistent with the existing values.

-techniques were more concrete and therefore were more difficult to understand.

-active trialibility was difficult until clients readily accept the need for the innovation.

-were easily observed, but first had to obtain a trial.

Finally, this research gave more support to the interior designer's willingness to adopt the innovation than to the actual implementation and adoption of the innovation.

LIMITATIONS

This Study

The time element was basic limitation to this study. There should have been a greater lapse of time between pretest questionnaire and treatment. The researcher then could have designed the treatment to cover the unknown questions on the pretest questionnaire, making the treatment more valid. Also, more complete control by the researcher over the treatment could have increased validity of the treatment.

The second way the time element was a limitation was the short time lapse between the pretest/treatment and the posttest. A longer time period would have given the designer more time to implement and adopt the innovation. The researcher would also have had more time to test and observe the changes in the subjects.

Another limitation to the research design was the sample size and non-random selection of the sample. While the sample was fairly representative of the population, a large sample could have been randomly sampled and randomly selected into control and experimental groups. This would have increased the internal validity of the design.

A limitation that is true of any research design which uses a real situation instead of a classroom or experimental situation is the lack of control of extraneous variables on the subjects. There is no control over other types of stimuli the sample may have encountered outside the treatment.

There is no means of telling if some subjects received information regarding solar energy or energy conservation between pretest and posttest. In replicating this research, this factor could be controlled for with a question about external influences on the posttest questionnaire. However, it is still felt by this researcher that the overwhelming benefits of using real subjects from the profession outweighed the faults of this limitation.

Finally, while the results of this research can be generalized to the population, that population contains only the Michigan Chapter of ASID. It would be most beneficial and instructive for the national ASID organization to conduct this type of research.

IMPLICATIONS

Future Research

The major benefit for replicating this research would be to increase the population to which the findings could be generalized. Very little applied research has been done in a profession of applied art. It would be beneficial to the ASID national organization as a whole, and professional interior designers specifically, to have an idea of the status of designers on the energy problem.

A review of the variables used in this study might indicate those of more significance to the designer. Further research could then be conducted to get a better focus to help educate the designer in this direction.

One early implication of this research was a method for interior designers and design students to obtain information relating directly to designing for energy efficiency. In accordance with this need, the researcher wrote a handbook for the interior designer titled, Solar Interiors: Energy a New Element in Design. This book has been the first direct application of the results of the original research design.

Policy

The frequency of response showed a 97 percent agreement to the statement that designers should adopt the design ethic of energy efficiency. With this large statement of agreement on this issue, MASID could implement this into their code of ethics. Thereby becoming the first state chapter of ASID to implement an energy policy. Further research

on the national level could constitute a similar policy implementation.

Education

One of the primary concerns of this research was the evaluation of the professional interior designer's knowledge of energy efficient, solar design techniques. An implication of this concern would be to then implement energy efficient, solar design techniques into the professional design education system.

This research indicated four aspects:
(1) Awareness - Over 75 percent of the interior designer's sampled are aware of the energy problem.
(2) Interest - One hundred percent of the interior designers sampled indicated an interest in providing a solution to the energy problem, feel a responsibility to their clients to make their interiors more energy efficient and are interested in learning more about energy efficient design. This data (1) provides a justification for initiating energy efficient design techniques and methods into the professional educational program, (2) provides justification for a book such as Solar Interiors: Energy a New Element in Design, and (3) justifies implementing seminars on energy efficient design for the practicing professional interior designer.
(3) Evaluation - A 25 percent increase in knowledge after the treatment was given indicates the ability of the interior designer to assimilate and integrate the technical/aesthetic approach to implementing energy efficient design techniques. This fact provides justification for giving control over the

efficiency and aesthetics of the interior environment to the interior designer.

(4) Adoption - Over 78 percent of the interior designers sampled indicate a willingness to adopt energy efficient design techniques. This justifies the assumption that interior designers are innovators. They are open to change and education in basic energy facts would strengthen their willingness to change. Thereby, increasing the probability of incorporating the value of energy efficient design not only as an ethic, but also as an active reality.

APPENDICES

APPENDIX A

LETTER OF INTRODUCTION
PRETEST QUESTIONNAIRE

MICHIGAN STATE UNIVERSITY

COLLEGE OF HUMAN ECOLOGY
DEPARTMENT OF HUMAN ENVIRONMENT AND DESIGN

EAST LANSING · MICHIGAN · 48824

May 1, 1977

Dear A.S.I.D. Member,

I have been a professional interior designer for the past nine years and am now entering the profession of interior design education. I am currently working on my master's thesis in the Department of Human Environment and Design at Michigan State University. The topic area for my thesis concerns the energy problem from the viewpoint of the interior designer.

For this research to be completed, I need your assistance by filling out the short questionnaire enclosed. Your cooperation will be of tremendous value in the initial research.

All responses will be completely confidential. Your response will be assigned a job number and analyzed accordingly to insure privacy. All data will be analyzed on an aggregate basis, not an individual level, but we do need your name and address to guard against repetition of data. However, do not underestimate the importance of your individual response.

I know there are many demands on your time--so why not answer and return the questionnaire right now? After answering, just fold over and staple as indicated, it is already stamped and addressed for your convenience.

I hope you will enjoy working on this small project. It is a valid research area and the results will be interesting and productive.

I truly appreciate your time and cooperation.

Sincerely,

Denise A. Guerin

Denise A. Guerin

Name_____
Address_____
_____

INTERIOR DESIGN AND ENERGY
MAY 1977

Job #_____

The energy problem is a concern of many people today. This is an opportunity for you to express your attitudes and opinions.

Directions: Unless otherwise instructed, please circle the number which best represents your response to each question.

1. What is your membership status in ASID?
   1. associate member
   2. professional member
   3. educational member

2. How many years have you worked as an interior designer?
   1. 1-5
   2. 6-10
   3. 11-15
   4. 16-20
   5. more than 20

3. How many hours per week do you work as an interior designer? Please include both in the studio and out of the studio hours.
   1. 1-20
   2. 21-30
   3. 31-40
   4. over 40

4. How many interior designers are on the staff of the studio with which you are associated?
   1. 1-3
   2. 4-6
   3. 7-9
   4. 10-12
   5. more than 12

5. What is the population of the service area where your studio is located?
   1. under 25,000
   2. 25,001-75,000
   3. 75,001-125,000
   4. 125,001-200,000
   5. 200,001-500,000
   6. over 500,000

6. What is the highest educational level you have completed?
   1. high school
   2. professional or technical
   3. college work, but no degree
   4. bachelor's degree
   5. graduate work, but no graduate degree
   6. graduate degree

7. Sex
   1. female
   2. male

8. Age
   1. 20-29
   2. 30-39
   3. 40-49
   4. 50-59
   5. 60-69
   6. 70 or over

9. Do you believe there is a shortage of energy today?
   1. Yes
   2. No

10. Do you believe the "energy crisis" of 1973 was a "put on" in order to raise fuel prices?
    1. Yes 2. No

11. Would you pay a higher initial cost to use solar power as an energy source rather than continue paying the increasing costs of the diminishing fossil fuels?
    1. Yes 2. No

12. According to your belief, rank these factors in order of their importance in making interior environments more energy efficient. (#1-most important to #6-least important)
    ___insulative properties of textiles
    ___sun resistent properties of textiles
    ___reflectance properties of interior materials
    ___absorption properties of interior materials
    ___double and triple glazing of windows
    ___interior and exterior shading devices

13. What factors do you perceive as comprising a mechanical solar energy system? (Please give brief description).

14., Are these factors generally aesthetically pleasing?
    1. Yes 2. No

15. Do these factors interfere with the function of the design solution?
    1. Yes 2. No

16. What factors do you perceive as comprising a passive solar energy system? (Please give brief description).

17. Are these factors generally aesthetically pleasing?
    1. Yes 2. No

18. Do these factors interfere with the function of the design solution?
    1. Yes 2. No

19. Are you incorporating any energy conserving ideas in your design solutions?
    1. Yes 2. No

20. Would you be willing to incorporate design innovations using solar energy?
    1. Yes 2. No

21. Do you consider prevention of heat loss through windows when you design window treatments?
    1. Yes 2. No

22. What total value do you place on sunlight in the interior environment?
    1. Beneficial 2. Detrimental

23. How much damage does sunlight cause to interior materials?
    1. Little 2. Some 3. Extensive

24. Do you think it is feasible for an interior designer to design an interior environment for use with solar energy?
    1. Yes 2. No

25. Do you think that designing with solar concentration in mind would be more costly?
    1. Yes 2. No

26. If there were aesthetically pleasing and functional materials on the market today for use in interiors with highly concentrated sunlight, would you adopt these materials in your interior design solutions?
    1. Yes 2. No

27. Do you think designing with solar concentration in mind would be detrimental to aesthetics?
    1. Yes 2. No

28. Do you, as a designer of interior environments, feel a responsibility to make these environments as energy efficient as possible?
    1. Yes 2. No

29. If you have a choice between two design solutions where one solution is strictly an aesthetical solution and the second is strictly a functional solution, which one would you choose?
    1. Aesthetics 2. Function

30. Have you ever designed an interior for a building that uses solar energy?
    1. Yes 2. No

31. I feel all interior designers must adopt the design ethic of energy efficiency.
    1. Strongly agree 4. Disagree
    2. Agree 5. Strongly disagree
    3. No opinion

32. Would you be interested in knowing how an interior designer can increase energy efficiency in an environment by implementing aesthetical changes?
    1. Yes 2. No

I greatly appreciate your contribution to this research project. The results of this questionnaire will be available to you at a future ASID meeting.

Comments:

APPENDIX B

LETTER OF INTRODUCTION
POSTTEST QUESTIONNAIRE
FOLLOW-UP LETTER

MICHIGAN STATE UNIVERSITY

COLLEGE OF HUMAN ECOLOGY
DEPARTMENT OF HUMAN ENVIRONMENT AND DESIGN

EAST LANSING · MICHIGAN · 48824

November 12, 1977

Dear A.S.I.D. Member,

As you may remember, I am working on my master's degree at Michigan State University. I am nearing the completion of my research and need your further cooperation.

Enclosed is the second and final questionnaire relating to interior design and energy. I appreciate the sincere response the first questionnaire received and hope this final one will receive your equal attention.

At first glance, some questions may seem identical to questions on the previous survey. This is because the comparison or responses to duplicate questions on each survey is basic to the success of my research.

I feel your response to this questionnaire is of prime importance in relating attitudes and concerns about energy to interior design. Having practiced as an interior designer, I know the designer with experience in the field is the person whose opinion is most timely. The response of practicing professionals is the basis for making this energy project so valid. You, the professional, are the one whose opinion we value when determining the status of design and energy. Again, all responses are strictly confidential.

I realize this is a very busy time of year for everyone, but please take a few moments to complete and return the questionnaire by December 20. Your input is vital to the research and the outcome of my project.

Thank you for your time.

Sincerely,

Denise A. Guerin

Denise A. Guerin

NAME _____
ADDRESS _____
_____

JOB #_____

INTERIOR DESIGN AND ENERGY
NOVEMBER 1977

DIRECTIONS: Unless otherwise instructed, please circle the number which best represents your response to each question. If you responded to the May questionnaire, please go directly to question #9.

1. What is your membership status in ASID?
   1. associate member
   2. professional member
   3. educational member

2. How many years have you worked as an interior designer?
   1. 1-5
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   3. 11-15
   4. 16-20
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3. How many hours per week do you work as an interior designer? Please include both in the studio and out of the studio hours.
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    2. No

11. Would you pay a higher initial cost to use solar power as an energy source rather than continue paying the increasing costs of the diminishing fossil fuels?
    1. Yes 2. No

12. According to your belief, rank these factors in order of their importance in making interior environments more energy efficient. (#1-most important to #6-least important).
    ___insulative properties of textiles
    ___sun resistant properties of textiles
    ___reflectance properties of interior materials
    ___absorption properties of interior materials
    ___double and triple glazing of windows
    ___interior and exterior shading devices

13. What factors do you perceive as comprising a mechanical solar energy system? (Please give brief description).

If you give no response to #13, please go directly to #16.

14. Are these factors generally aesthetically pleasing?
    1. Yes 2. No

15. Do these factors interfere with the function of the design solution?
    1. Yes 2. No

16. What factors do you perceive as comprising a passive solar energy system? (Please give brief description).

If you give no response to #16, please go directly to #19.

17. Are these factors generally aesthetically pleasing?
    1. Yes 2. No

18. Do these factors interfere with the function of the design solution?
    1. Yes 2. No

19. Are you incorporating any energy conserving ideas into your design solutions?
    1. Yes 2. No

20. Would you be willing to incorporate design innovations using solar energy?
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    1. Yes 2. No

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    1. Yes 2. No

29. Have you ever designed an interior for a building that uses solar energy?
    1. Yes 2. No

30. I feel all interior designers must adopt the design ehtic of energy efficiency.
    1. Strongly agree
    2. Agree
    3. No opinion
    4. Disagree
    5. Strongly disagree

31. In which method, of obtaining information on designing for solar energy and energy efficient environments, would you be most interested?
    1. booklet or pamphlet directed to interior designers
    2. 2-3 day seminar for interior designers
    3. additional presentations at ASID chapter meetings
    4. course for interior designers, 5-10 weeks, one night per week
    5. other, please list

32. What is your approximate annual income?
    1. $1,000-$4999
    2. $5000-$9999
    3. $10000-$14999
    4. $15000-$19999
    5. $20000-$24999
    6. $25000 or over

33. Did you attend the June 8 ASID meeting held in East Lansing?
    1. Yes 2. No

34. Since you have contributed research data, would you like a summation of my thesis upon its completion?
    1. Yes 2. No

I greatly appreciate your time and contribution to this research project.
Thank you.

Comments:

MICHIGAN STATE UNIVERSITY

COLLEGE OF HUMAN ECOLOGY
DEPARTMENT OF HUMAN ENVIRONMENT AND DESIGN

EAST LANSING • MICHIGAN • 48824

Dear A.S.I.D. Member,

Many thanks for your response to the Energy/Design questionnaire. The research will be completed as soon as all responses are analyzed.

Since there was a mail slow-down at the time the questionnaire was sent out, you may not have received yours before the deadline. That deadline has now been extended so you can still respond and return the questionnaire. PLEASE do so at once. Your response is vital.

If you no longer have the questionnaire, please drop me a note and a new one will be sent. I appreciate your concern and time. Thank you.

Sincerely,

Denise A Guerin

Denise A. Guerin

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