COMPREHENSION OF THE METRIC SYSTEM AND ATTITUDES TOWARD METRICATION AMONG PROFESSIONAL INTERIOR DESIGNERS IN THE AMERICAN SOCIETY OF INTERIOR DESIGNERS

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Submitted to the Faculty of the Graduate College
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in partial fulfillment of the requirements
for the Degree of
DOCTOR OF EDUCATION
May, 1978

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ACKNOWLEDGMENTS

Sincere appreciation is extended to everyone who contributed encouragement and guidance throughout the period of graduate study--to faculty, friends, and family.

Appreciation is extended for the efforts of the doctoral committee: to Dr. Elaine Jorgenson, adviser, for her assistance, guidance, and inspiration throughout the study; to Dr. Anne Gorman, for her scholarly advice and critical reading of the manuscript; to Dr. John Jobe, Mrs. Christine Salmon, and Miss Leevera Pepin for serving as members of the advisory committee. The committee's guidance was vital to the completion of the research, as was that received from Dr. William Warde and Iris McPherson who advised and assisted in the statistical analysis of the data.

Indebtedness is extended to the professional members and to Albert Phibbs, President of the American Society of Interior Designers who pretested the instrument and participated in the study. A note of thanks is also due the administrators of Central State University for making educational leave possible.

Finally, I would like to express my indebtedness to my parents, Mr. and Mrs. Alfred T. Reece, for instilling in me the desire to learn; to my husband, Dean Myers, for his continuing support and personal encouragement; and to my daughter, Deidre Dawn Myers, and my son, Aric Dean Myers, for their patience.

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CHAPTER I

INTRODUCTION

Ralph Waldo Emerson in The American Scholar stated, "Fear always springs from ignorance" (Wood, 1966, p. 330). Many adults across the United States are starting to rebel against the idea of having to learn about grams, meters and liters as the metric system becomes official in years ahead. The reasons, according to metric advocates, are a general fear of the unknown and apprehension about the cost of conversion (U.S. News and World Report, 1976).

The greatest challenge in metric conversion is in adult education, where the ultimate pocket of resistance occurs (Brundage, 1976). The great barrier to the public acceptance of metric measurement appears to be anxiety, the fear of the unknown, the dread that learning to use metrics will be difficult (Rees and Livermore, 1976).

A survey of home economists by the American Home Economics Association's Consumer Interests Committee, in August 1970, shows that the more knowledgeable a person is about metrics, the more receptive he or she would be to the conversion (Parker, 1973). The United States Metric Study (1971) of public attitudes toward change to metrication indicates that the more people know about the metric system the more they favor it. Parker (1973) has tested the premise that the more knowledgeable one is about the metric system the more accepting of the system one will be. He finds that when consumers demonstrate more

awareness of the metric system there is also greater confidence about the ease of adjusting to the new system. The American Institutes for Research has found several factors to be hampering the national effort, one of which is an apathetic and divided public (Brundage, 1976).

In 1978, conversion to the metric system is at last on the horizon, and it is expected that by 1980 the United States will be using metric measures predominantly. In 1968 an act providing for a three-year program to determine the impact of increasing use of the metric system on the United States was passed by Congress and signed into law by President Lyndon B. Johnson (De Simone, 1971). The results of this study were submitted to Congress in 1971. The Secretary of Commerce has recommended to Congress that the United States change to predominant use of the metric system through a coordinated national program (Bright and Jones, 1973). Debate has continued with little action until December 23, 1975, when President Gerald Ford signed the Voluntary Metric System Bill, which outlines a ten-year plan for voluntary transition to the metric system (American Metric Journal, 1976).

Mort (Miles, 1964) has reported a 50-year lag between the creation of knowledge in education and its dissemination. However, there is not 50 years to "go metric". Ten years is the length of the conversion period commonly recommended (De Simone, 1971). A strategy is therefore necessary to facilitate implementation of the metric system.

In order to promote change to the metric system of measurement, metric instruction that meets the needs of individuals and industry must be developed. Little is known about the problems that students or adults in this country have in learning the metric system. Therefore, governmental and private agencies should lend early support to research

efforts related to means by which metrication can be best accomplished at all grade levels and for preservice and inservice workshops (De Simone, 1971).

One important conclusion of the United States Metric Study survey on public attitudes is that the more people know about metrics, the more they like metrication (Hendrickson and Corrigan, 1974). For this reason, the program of public education is essential to the success of a national conversion program.

Purpose and Objectives of the Study

The purpose of this study is to determine base-line information needed to tailor metric instruction programs for practitioners in the interior design profession. The specific objectives for the study are:

1. Identify to what extent metric units are currently being used in the interior design industry.
2. Assess attitudes among interior designers toward change to the metric system.
3. Identify the preferred method for receiving metric education and which employees would benefit.
4. Make recommendations as to means by which metric education can be best accomplished in the interior design profession.

Hypotheses

The null hypotheses for the study will test certain personal and professional characteristics that may be impacting upon attitudes toward the metric system and comprehension of the metric system. The A.S.I.D. region variable is also tested for impact on attitude toward and

comprehension of the metric system. The following hypotheses will be tested:

H_1: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers among regions designated by A.S.I.D.

H_2: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected personal variables (sex, age, and educational background).

H_3: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected professional variables (years of practice, use of imported merchandise, and type of practice).

H_4: There is no significant difference in comprehension of the metric system by interior designers among regions designated by A.S.I.D.

H_5: There is no significant difference in comprehension of the metric system by interior designers and selected personal variables (sex, age, and educational background).

H_6: There is no significant difference in comprehension of the metric system by interior designers and selected professional variables (years of practice, use of imported merchandise, and type of practice).

The researcher set a .05 level of significance for acceptance or non-acceptance of the hypotheses.

Assumptions

The following assumptions are pertinent to the conduct of the study. They are:

1. Transition to the metric system will continue and be completed in the United States within the next decade.
2. An instrument can be developed to identify attitudes of interior designers toward the metric system.
3. The responses to the questionnaire by the A.S.I.D. members are spontaneous, conscientious expressions of their attitudes and opinions of the metric system.

Limitations of the Study

The sample selected for this study is limited to interior designers who are professional members of the American Society of Interior Designers (A.S.I.D.). The 1977 rosters are being used to obtain the participants' names; therefore, names of persons obtaining membership during the year of 1977 are not included. The representation of design occupations did not include other design organizations or related design professions.

The instrument to obtain the data has been developed by the researcher. The data obtained are limited to those instruments which were returned from an initial mailing of the questionnaire and a follow-up mailing.

The level of metric comprehension attained is limited due to the reluctance of the pilot-test respondents to answer questions requiring the solving of specific problems. Also, the study is limited to the validity and reliability of the instrument.

Definition of Terms

The following terms are continually used throughout the study and need to be defined. These are:

Metric System--the measurement system that commonly uses the meter for length, the kilogram for mass, the second for time, the degree Celsius for temperature, and units derived from these (De Simone, 1971).

Metrication--any act tending to increase the use of the metric system, whether it be increased use of metric units or of engineering standards that are based on such units (De Simone, 1971).

Planned Metrication--metrication following a coordinated national plan to bring about the increased use of the metric system in appropriate areas of the economy and at appropriate times. The inherent aim of such a plan would be to change a nation's measurement system and practices from primarily customary to primarily metric (De Simone, 1971).

American Society of Interior Designers (A.S.ID.)--a national non-profit association of interior designers, organized to maintain standards of design and professional practice (Gueft, 1975).

Professional Interior Designer--a member of A.S.I.D. who meets the educational and employment requirements and who has passed a qualifying examination.

Attitude--a readiness to react toward or against some situation, person or thing, in a particular manner, for example, with love or hate or fear or resentment, to a particular degree of intensity (Good, 1959).

Base-line--basic information that would impact decisions regarding the planning of instructional materials.

Summary

This study is organized into five chapters. The significance of the study is stated in the introduction to Chapter I. It is followed by the statement of the problem, purpose and objectives of the study, assumptions of the study, limitations of the study, hypotheses, and a definition of terms. A review of the literature that relates to the research will follow in Chapter II. The procedure and method used in conducting the study will be described in detail in Chapter III. The findings of the study and the analysis and interpretation of these findings are presented in Chapter IV with the summary, conclusions and recommendations presented in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

Teaching school children and adults to use the metric system is the job of the Office of Education's Metric Education Program, established by the Education Amendments of 1974. These grants and contracts provide money for schools to incorporate metric instruction into their regular curriculums. Instead of stressing information or awareness, the program is emphasizing the actual teaching of people to use the metric system (Blondell, 1976).

With conversion to metrics there will be natural human resistance to change (American Metric Journal, 1974). Many overseas teachers are fearful of the change-over process. Reducing and preventing unnecessary fears can be accomplished by demonstrations of the basic simplicity of direct measurement in the metric system and avoiding an emphasis on conversion (School Shop, 1975).

In order to develop educational programs for adults, one must identify areas where special needs might exist. Areas reviewed include: instruments for assessing attitudes, methods of teaching metric education, and responses to metrication.

Instruments for Assessing Attitudes

An understanding of the methods for assessing attitudes is pertinent to the understanding of the instrument. An attitude is a

predisposition to think, feel, perceive, and behave toward a cognitive object according to Kerlinger (1966). Another definition in the Educational Dictionary which agrees with that given by Kerlinger is:

> Attitude: a readiness to react toward or against some situation, person or thing, in a particular manner, for example, with love or hate or fear or resentment, to a particular degree of intensity (Good, 1959, p. 119).

Two methods for evaluating attitudes of the individual are (1) direct observation and (2) attitude scales. Attitude scales, a type of self-report inventory, are designed to measure the extent to which an individual has favorable or unfavorable feelings toward an object or an idea. It is feasible to use an attitude scale where the individual has little reason for distorting the results. A common research use is in the study of attitude changes or attitudes toward a particular experience (Gronlund, 1965).

Thurstone (1959) defines opinion as a verbal expression of an attitude. Since an opinion symbolizes an attitude, we may use statements of opinion as a means of measuring attitude; however, it must be acknowledged that opinions are merely indices of an attitude. Thurstone stated that:

> It must be recognized that there is a discrepancy, some error of measurement, as it were, between the opinion or the overt action that we use as an index and the attitude that we infer from such an index (p. 217).

Three types of attitude scales are: summated rating scales often called Likert-type scales, equal appearing interval scales, and cummulative (Guttman) scales. A summated rating scale is a set of attitude items, all of which are considered of equal "attitude value." Responses, usually made on a five-point scale, are summed and averaged to yield an individual's attitude score.

Thurstone's equal appearing interval scales are built so that each item is assigned a scale value and the scale value indicates the strength of attitude of an agreement response to the item. The items of the final scale to be used are so selected that the intervals between them are equal (Thurstone and Chave, 1929).

The cumulative, or Guttman scale, consists of a relatively small set of homogenous items that are unidimensional which means that the scale measures only one variable. The cumulative scale is so named because of the cumulative relation between items and the total scores of individuals. If one knows a person's total score, he can predict his pattern of responses.

Of the three types of attitude scales, the summated rating scale seems to be the most useful in behavioral research. The summated rating scale, sometimes called the Likert technique, is a set of attitude items, all of which are considered of approximately equal attitude value, and to each of which subjects respond with agreement or disagreement, thus expressing the intensity of his or her feeling toward the object in question. The scores of the items are summed, or summed and averaged, to yield an individual's attitude score. The purpose of the summated rating scale is to place an individual somewhere on a continuum of the attitude in question (Hall, 1967; Kerlinger, 1966).

Methods of Teaching Metric Education

Educators can help smooth the transition to metrics by (1) continued participation in the discussions and planning of metric conversion, (2) initiating and assisting in formal and informal public education activities, (3) contributing to research on any unresolved problems or

questions associated with metric conversion, and (4) by scrupulously using the metric system themselves (Rees and Livermore, 1976). Education for the metric system has started formally in many school systems in the United States and informally through adult education on radio, television, newspaper, and advertisements as more and more items are discussed in metric terms. A limited survey has shown that informal education efforts are making an impact on the knowledge and attitude of consumers toward metrication (Barcher, 1976).

A series of instructional television and radio spots designed to introduce both children and adults to international units are now being produced under an Office of Education contract. The series, "Take Ten, America", was distributed to stations for public service use early in 1977 (Elwell, 1976). The British Metrication Board also has launched a three-million-dollar campaign using rhyming jingles to persuade people to accept grams, liters, kilometers, and learn how to make the conversion (U.S. News and World Report, 1976).

Henry, Choate, and Firl (1974) state that a new life will emerge from measurement if simple relationships are emphasized, more estimation is done, and the process is directly taught. They favor "hands-on" experience more than anything else. Brundate (1976) also finds that nothing succeeded as well in getting students to think metric as having "hands-on" experiences. U.S. News and World Report (1976) emphasizes the idea of teaching metric measurement independently from the old system rather than making constant translations back and forth. The stress is on learning by doing, not by memorizing.

Most adults will want information, not motivation. The mere idea of offering adult workshops is to give them an opportunity to find out

what is happening (Peavler, 1974). U.S. News and World Report (1976) reports that training for the metric system turned out to be fairly simple when presented on a "need to know and when needed to know" basis.

Robinson (1971) believes that the most effective method for adults is to provide a concentrated period of time in which they have both extensive and intensive experience in practical use of the metric system in a wide variety of physical measurements and in problem solving. Quick mastery of the metric system is highly desirable because the numbers of occasions at work, play, and home that require some use or understanding of measurements are astounding (Batcher, 1974).

Warning (1974) reports a survey that was done at the University of Michigan and of those surveyed 46 percent thought television the best method for educating the public about the metric system. Fifty percent of this same group responded that they would attend a course to learn the new system of measures, but 34 percent reported they would not.

Training should be in short activity sessions, distributed over time and alternated with class tryouts of materials and strategies (School Shop, 1975). A two- or three-hour session each week for six to eight weeks is highly endorsed and considered adequate. One-time crash courses receive little support. However, Elwell (1976) finds that the possible exception to using crash courses in metrics would be in adult education courses that are geared to imminent conversions in businesses or industries.

Advance planning is the most important single effort to be made when metrication is contemplated (Hopkins, 1974). The United States

Office of Education is helping change the nation's schools to metric with several programs. Thirty states have definite plans or are already teaching metric (Hopkins, 1977).

As it becomes more apparent that education is the tool to metrication, strives are being made to alleviate possible problems. Oppert (1975) has designated a number of principles to use when teaching anyone above the elementary level. These principles are:

1. Understanding the need for adopting the metric system and its impact on the nation as well as on home economics, will help persuade others to learn the metric system.

2. Converting from the customary measurement system to metric or vice versa can be confusing, involve many mathematical calculations, take a lot of time, create a false complexity about the metric system and help to maintain the customary system.

3. Illustrating the relationships between the metric units of length, area, volume, and mass helps students to understand the logic, simplicity, and design of the metric system.

4. Emphasizing measurement activities where the students are actively involved in the measurement processes and experiences will help the students develop an understanding of the metric system.

5. Consistency in spelling, notation for decimal placement and terminology eliminates needless confusion.

6. The continued use of customary and metric units makes it more difficult to unlearn the customary measurements; conversion from one unit to another becomes a common but undesirable practice.

7. The use of metric measurement in the home and community reinforces the school activities and aids learning and retention.

8. If the students gain self-confidence in working with the metric units they will be more likely to continue using them in situations outside the classroom.

9. Conversion costs can be reduced by timing the replacement of appropriate items so they are coordinated and replaced at the end of their regular lifespan, whenever possible (p. 15).

Cartwright (1971) indicates that the key to bringing about conversion to the metric system is in the development and implementation of curriculum. Educators should plan courses to bring about rapid and effective conversion.

Attitudes Toward Metrication

Important considerations to the success of conversion to the metric system are the attitudes of the individuals involved. Attitudes reviewed include: attitudes according to age and sex of the individual, attitudes according to the location or region of the individual, and attitudes according to the educational background of the individual.

Age and Sex

Children will learn to think metric much faster than adults who will probably resort to conversion aids frequently. Children will not have the mental block that adults will have about discarding the customary system and learning a new system (Batcher, 1974). U.S. News and World Report (1976) states that "For the kids, it has been great" (p. 32). The younger they are, the more readily they adapt to the change. "For the children, it was no big deal" (Brundage, 1976, p. 9).

"You'll never metricate me. I'll die with my imperial-sized boots on," uttered one Australian to his metric conversion board (Brundage, 1976, p. 12). After five years of metric exposure, many of the ordinary citizens in the converted countries still feel this way. Despite extensive public education and metric awareness programs, a 1975 Gallap Poll shows that 50 percent of Australians, most of them 50 years or older, feel that metrication should be slowed or stopped. Australian educators

wish in retrospect that they had made more of an effort to reach parents and other segments of the adult population with some metric aid (Brundage, 1976).

In the United States Metric Survey, Rothrock (1971) finds that the younger respondents are more willing to change than are older persons. There is a tendency for age to correlate negatively with willingness to attend a course on metric measures; however, the relationship is not consistent and the only marked difference is in the small number of positive responses among persons over age 65.

The observation made by Senator Charles Summer in 1866 can be seen today.

> Those who have passed a certain period of life may not adopt the metric system, but the rising generation will embrace it, and everafterwards number it among the choicest possessions of an advanced civilization (Parker, 1973, p. 15).

Differences among persons of different age and sex are significant, although the amount of variation which is accounted for by these variables is not large (Rothtock, 1971). Females express greater opposition to domestic use of the metric system than males. Males more frequently say they would attend a course to learn the new measures than do females.

Location or Region

In an interview done by U.S. News and World Report (1976) opposition to metrics is found that appeared to be based on the region. Dean Krakel (1976) Director, National Cowboy Hall of Fame, stated:

> Here in the West, we're closer to our heritage, the land. Western people are fiercely independent. We resent metric conversion. We've never had a chance to vote on it, Congress is bringing it in the back door (p. 34).

Educational Background

Rothrock (1971) makes the following observations concerning educational background:

1. Persons with less than a high school diploma expressed less willingness to attend a course than respondents with more formal education.
2. About 75 percent of the persons with less than a high school diploma expressed opposition to the change.
3. Persons of higher educational attainment were more likely to respond positively to adoption of the metric system.
4. Respondents with higher education emphasized the advantages and minimized the disadvantages of metrication.
5. Persons with higher educational attainment were somewhat more likely to mention television as a preferred method of educating the public about the metric system.

Summary

Efforts are being made by the United States to teach people to use the metric system. However, metrication is feared by those who are unfamiliar with the system.

Attitudes toward the metric system seem to be related directly to the characteristics of the individual involved in metrication. Younger respondents are more willing to change to the metric system than are older persons. Females express greater opposition to domestic use and to educational courses than do males. Persons with higher educational attainment are more willing to respond positively to metrication.

The key to bringing about conversion to the metric system is in the development and implementation of metric instruction. Education is the tool to metrication.

CHAPTER III

RESEARCH DESIGN

The purpose of this chapter is to describe the methods and procedures used in conducting the study. These are determined by the central purpose and objectives of the study as they dictate a research design enabling the gathering of base-line information. As this material is descriptive in nature, the study is accomplished through the survey method.

Compton and Hall (1972) have described survey research as "having the principal contribution of describing current practices or beliefs with the intent of making intelligent plans for improving conditions or processes in a particular local situation" (p. 139). Survey research in the scientific sense is a development of the twentieth century. In the past much of this type of research has been criticized for being largely descriptive, setting forth facts and observations without seeking causes and analyzing inter-relations among variables. If survey research is explanatory or analytical in nature, inferences can be drawn from samples to the whole population regarding prevalence, distribution, and inter-relations of variables. "Survey research is probably most commonly used to obtain the opinions and attitudes of individuals and to study social structure" (Kerlinger, 1964, p. 422).

When conducting survey studies the following limitations must be considered:

1. Surveys are dependent on the cooperation of respondents.

2. Information not known to the respondents cannot be obtained.

3. Respondents are likely to over-estimate those characteristics that will make them look good and to minimize those for which society has low esteem.

4. Information obtained from a single survey is less reliable than trend data derived from two or more surveys made by the same methods.

5. Surveys cannot be aimed at obtaining exact quantitative forecasts of things to come (Compton and Hall, 1972).

The purpose of the study is to determine base-line information needed to tailor metric instruction programs for practitioners in the interior design profession. Opinions and attitudes toward areas of emphasis in metric education and comprehension of the metric system will be obtained through the survey technique. Current practices and beliefs will be identified through the survey with the intent of making plans for metric education for the interior design profession.

In order to collect and analyze data pertaining to the purpose and objectives of the survey, it has been necessary to accomplish the following tasks:

1. Determine the population for the study.

2. Develop the instrument.

3. Develop a procedure for validating the instrument.

4. Collect the data.

5. Select method of data analysis.

In the following paragraphs the procedures of this study are discussed in detail.

The Study Population

This study enlists the participation of the professional members of the American Society of Interior Designers in order to determine if a desire exists for metric education and identify the preferred method of receiving metric instruction. The membership structure of A.S.I.D. is composed of professional members, associate members, educational affiliates, and press affiliates.

As of September 30, 1977, there are 6,245 professional members among the total national membership in A.S.I.D. This particular organization is chosen because the membership is divided into regions, consists of males and females, has similar admission requirements for all members, contains a broad age range, and the researcher is a member. The regions designated by A.S.I.D. include: (1) Northeast, (2) Mid-Atlantic, (3) Southeast, (4) East Central, (5) West Central, (6) Mid-West, (7) Southwest, (8) Rocky Mountain, (9) North Pacific, and (10) South Pacific.

A demographic profile has been gathered by the Executive Consultants, Inc. in 1973 before the consolidation of the American Institute of Interior Designers and the National Society of Interior Designers and shows the sex and age distribution among the combined membership (Gueft, 1975). Both organizations contain male and female members and both have members in age brackets from under 30 to over 60 years of age.

In order to obtain a random sample of professional A.S.I.D. members, it is first necessary to compile a national listing of current professional A.S.I.D. members. Upon written request to A.S.I.D. national headquarters, a list of the 44 chapter secretaries and their addresses

has been received. A letter (Appendix A) will be mailed in September, 1977, to the chapter secretaries requesting current chapter rosters. The Oklahoma chapter roster is not included as they are to pretest the instrument. After receiving ten chapter rosters, a follow-up letter is to be mailed in October, 1977, to the remaining 43 chapter secretaries. This follow-up letter has resulted in 18 more responses from chapter secretaries. A final telephone contact in October, 1977, prompts six more responses. A total of 34 chapters have responded to the request, and of these three have to be eliminated. One chapter did not have a current roster and two rosters are incomplete. The research population has been taken from the 31 complete remaining rosters. A summary of the chapters responding is in Appendix B.

This method of compiling the national listing limits the total population, as 2,098 members from 12 chapters are not available to the researcher. Instead of 6,245 national members from which to draw a random sample, there are 4,147 or 66 percent of the national membership of A.S.I.D.

Folders are used for the ten regions names of members and as each chapter roster is received it is placed in the appropriate folder. Sequential numbers are assigned to the professional A.S.I.D. members as the lists are received with the first roster in each region beginning with number one.

After the regional lists have been compiled and numbered, a random number generator has been obtained from the Central State University computer center. A five to ten percent sample has been recommended by the computer center or 312 to 625 professional interior designers. Since a lower than average return is anticipated because the population

is among industry, a ten percent random sample or 625 designers has been selected. Ten percent of the total membership of each region has been selected in order to keep the sample in proportion to the national distribution (see Appendix B). The numbers received from the computer printout that corresponded to those in the rosters constitute the sample population.

Instrumentation

Due to time and travel limitations as well as the magnitude of the study population, a written questionnaire seems to be the most appropriate type of instrument for the survey. A table of specifications has been constructed to show the objectives of the study and the test items (see Appendix C). The instrument (Appendix D) is designed to obtain four types of information from the respondents. They are: (1) general information about the respondents, (2) information related to the objectives, (3) attitudes toward areas of emphasis in metric education, and (4) comprehension of the metric system. Each type of information desired from the respondents is included in a separate section of the questionnaire for ease and accuracy of tabulation and analysis.

The general information is organized as the first page of the instrument and consists of the independent variables of the study. The specific classifications for these variables are taken from the Interior Design Demographic Profile (Gueft, 1975). Areas covered include: sex, age, educational background, years in interior design practice, use of imported merchandise, and type of practice. The information is obtained through open-ended questions.

Part two of the instrument is designed to obtain information concerning attitudes toward the metric system, desire for metric instruction, and preferred method of instruction. The information is obtained through open-ended questions and a Likert scale.

The last page of the questionnaire is related to designing with metrics and is used to determine a level of metric comprehension. Matching statements are used.

The cover letter (Appendix E) for the questionnaire contains a statement of purpose, an endorsement by A.S.I.D., and the A.S.I.D. theme. The statement of purpose explains the reason for the questionnaire, the use of the information and a date by which the completed questionnaire should be returned. An endorsement by H. Albert Phibbs, President of the American Society of Interior Designers, is used with the hope of increasing participation among the membership. The A.S.I.D. theme, "Horizons 77", is used to identify with the society and emphasize the study as an issue in the near future.

Reliability and Validity of the Instrument

To determine the reliability of the developed instrument, it has been administered to six Oklahoma members prior to the pretest. Gronlund (1965) states that the procedure for this test-retest method is to give the same test twice to the same group with any time interval between the tests. Popham (1967) says that when one tests the mean difference between two sets of scores for the same subjects, there is likely to be a positive correlation between the two sets of scores. To determine if a positive correlation exists between the tests, the

Pearson Product Moment correlation coefficient is figured. The raw score correlation formula used for the computation is printed below (Popham, 1967).

$$r = \frac{EXY - \frac{(EX)(EY)}{n}}{\sqrt{\left(EX^2 - \frac{(EX)^2}{n}\right)\left(EY^2 - \frac{(EY)^2}{n}\right)}}$$

X = individual score on test 1

Y = same individual score on text 2

n = number of pairs of scores

A coefficient, or r value, may range from 1.00 to -1.00, with a perfect positive correlation reflected by an r of 1.00, a perfect negative correlation reflected by an r of -1.00, and a zero value for r indicates no correlation. Since r = .9621, there is a strong positive correlation for the test and the test has a test-retest reliability.

Before the final form of the questionnaire is distributed to the sample chosen, a pilot-test has been conducted for the instrument. The pilot testing is done by administering the questionnaire to the Oklahoma Chapter of A.S.I.D. on October 25, 1977, at the state meeting in Tulsa. These individuals have been asked to complete the questionnaire and to make any comments and suggestions that they felt would improve the instrument. The evaluation is based on the following points: clarity of the wording, form, suitability of the length of the instrument, content, and ease in completing the questionnaire. This establishes the instrument's validity. Since the Oklahoma members pretested the instrument, they are excluded from the survey.

The pilot testing of the questionnaire brought about a number of revisions in the instrument. Some alternatives to the multiple choice

questions have been added and others have been deleted due to the suggestions given by the pretest group.

The major change to the questionnaire is the revision of part three related to metric comprehension. The original section examines metric comprehension in depth and includes metric arithmetic, decimal arithmetic, and conversion (see Appendix F). It is the concensus of the pretest group that the section is too long, requiring "too much time and effort". They feel that the questionnaire would not be returned to the researcher in its present form. A brief matching question has been substituted as an acceptable alternative. This limits the extent of metric comprehension which could be measured from the respondents, but has made the instrument acceptable to members of the interior design profession.

The final form of the questionnaire has been duplicated by the Central State University print shop. To guard against lost pages, it was printed on both sides of 11 by 17 paper and then folder in pamphlet form. Colored paper has been used to help with regional coding. Even though the ten regions are coded numerically, the colors facilitate visual differentiation.

Data Collection

The data for the study have been obtained from a mailed questionnaire to 625 interior designers in the United States who are professional members of the American Society of Interior Designers. Cover letters accompany the questionnaires and stamped, self-addressed envelopes are enclosed for their reply. Each questionnaire is identified by a code number of avoid mailing follow-up reminders to those who have returned

the instrument. Follow-up leters have been mailed in November, 1977, to those who did not respond (Appendix G). In all, a total of 282 of the designers has responded to the questionnaire. Six of the designers who did not wish to participate in the study indicate the reasons for their decision. The reported reasons are: illness, retirement and lack of interest. Two of the respondents have moved out of the United States and have mailed their replies from Canada and Germany. Twelve of the letters have been returned due to incorrect addresses (two percent).

Statistical Procedure

The data secured from the respondents are punched on cards for computer analysis. The frequency of responses and response percents are obtained for each item on the general information section of the questionnaire. These items pertained to sex, age, educational background, years of practice, use of imported merchandise, and type of practice.

The statements on the questionnaire related to the objectives which identify specific information sought are analyzed by frequency of response. A rank order is obtained to identify information which the respondents most preferred to those in which they least preferred.

Attitude toward areas of emphasis to be included in metric education is secured from responses to an attitude scale. The response for each area of emphasis is assigned a numerical value. In scoring the responses, the alternatives are weighted as follows (Compton and Hall, 1972):

Strongly Agree = 1

Agree = 2

Undecided = 3

Disagree = 4

Strongly Disagree = 5

The numerical values of all designers' responses to each area of emphasis are summed and a mean obtained. The areas of emphasis are ranked in order according to the mean score of the statement. This technique has been used fruitfully to assess attitudes in a great many studies (Runkel and McGrath, 1972). The mean score is analyzed for variance among the individual variables.

Comprehension of the metric system is secured from responses to the matching questions. The scores are summed and means are obtained. The mean score is analyzed for variances among the individual variables.

Analysis of variance is used to determine whether there is a significant difference between mean scores of two or more groups. The analysis of variance permitted a study of the action of two or more independent variables simultaneously on an affected or dependent variable (Siegel, 1956). The assumptions associated with the statistical model underlying analysis of variance are:

1. the scores or observations are independently drawn from normally distributed populations
2. that the populations all have the same variance
3. that the means in the normally distributed population are linear combinations of effects due to rows and columns, that is the effects are additive
4. the F test requires at least interval measurement of the variables involved

5. the interval scale is characterized by a common and constant unit of measurement which assigns a real number to all pairs of objects in the ordered set (Siegel, 1956, p. 19).

The value of F is obtained by dividing the between mean squares by the within mean square (Popham, 1967).

$$F = \frac{\text{Between groups mean square}}{\text{Within groups mean square}}$$

In order to obtain the F value by which the null hypotheses is assessed, the following quantities are needed:

1. the sums of squares for the total group, within groups, and between groups;

2. the degrees of freedom for the within groups and between groups; and

3. the mean squares for the within groups and between groups (Popham, 1967, p. 180).

The F value is calculated from observed data and the results are checked against an F table. If the obtained F value is as great or greater than the appropriate labeled tabled entry, the difference reflected is statistically significant (Kerlinger, 1972). For the analysis of variance, the .05 level of probability is selected as the level which the F score must equal in order for the difference to be signficant. The F score however does not indicate which differences may be considered statistically significant.

The Duncan's Multiple Range analysis is used to determine which of the differences among the treatment means are significant and which are not (Steel and Torrie, 1960). The basic computational formula for computing the Duncan's Multiple Range critical difference is (Bruning and Kintz, 1977):

$$\text{C. diff.} = Kr \sqrt{\frac{\text{MS within group error}}{\text{N (per gp)}}}$$

The data are to be processed on an IBM 360-50 computer using the Statistical Analysis System 72.

CHAPTER IV

ANALYSIS OF DATA

The purpose of this study is to determine base-line information needed to tailor metric instruction programs for practitioners in the interior design profession. A review of the literature revealed factors which are relevant to attitudes toward and comprehension of the metric system. These factors served as a basis for identifying variables for the study. The variables which are identified related to: regional location, age, sex, educational background, years of practice, use of imported merchandise, and type of practice. These six categories provide the framework for developing the questionnaire and analyzing the data.

The results of the analysis of data are presented in this chapter in four parts. Characteristics of respondents are presented to gain a composite knowledge of the population. Analysis of the objective data is designed to offer an analysis of the objectives to which this study addresses itself. Attitude toward areas of emphasis in metric education is an analysis of the hypotheses related to attitudes of interior designers toward areas of emphasis in metric education. Comprehension of the metric system is an analysis of the hypotheses related to comprehension of the metric system by interior designers.

Statistical analysis of the data is reported as frequencies and percentages, the F statistic, the Duncan's Multiple Range test, and

the correlation coefficient. The frequencies and percentages are reported to establish values for each of the variables with which the study is designed. Analysis of variances are provided to indicate the existence of significant differences and the Duncan's Multiple Range test provides the direction of the significant differences. The correlation coefficient is added to show the magnitude of an existent difference.

Part 1--Characteristics of Respondents

Analysis of information about the respondents may reveal characteristics which are important for meaningful interpretation of the attitudes toward areas of emphasis to be included in metric education and comprehension of the metric system as reported by interior designers. The number of responses analyzed is 282 (45 percent) of 625 questionnaires distributed. The information about the respondents is discussed according to sex, age, educational background, years of practice, use of imported merchandise, and type of practice.

Sex

Among the sample population a close distribution is found between male responses (53.4 percent) and female responses (46.6 percent) as can be seen in Table I. This corresponds with the Gueft (1975) study which shows that a larger percent of professional interior designers in A.S.I.D. is male.

Age

Over 80 percent of the respondents in the study is between 30 and

TABLE I

PERSONAL CHARACTERISTICS OF THE POPULATION

Characteristic	Number	Percent
Sex		
Female	129	46.6
Male	148	53.4
Age		
under 30 years of age	23	8.2
30 to 45 years of age	117	41.6
45 to 60 years of age	109	38.8
over 60 years of age	32	11.4
Educational Background		
high school	18	6.5
bachelors	185	67.0
masters	29	10.5
doctorate	1	.4
not received a diploma	6	2.2
certificate	23	8.3
other	14	5.1

60 years of age. This is fairly equally distributed between 30 to 45 years of age (41.6 percent) and 45 to 60 years of age (38.8 percent). Of the remaining population, 8.2 percent is under 30 years of age and 11.4 percent is over 60 years of age (see Table I).

Educational Background

The majority of the sample population (67 percent) have received bachelors degrees. The study reveals that one-tenth of the population have earned masters degrees. Certificates from design schools have been received by 8.3 percent, and high school diplomas only have been earned by 6.5 percent of the population. Additional training is reported by five percent of the interior designers. This includes travel and field experience, and undergraduate and graduate courses at the university level. Those who have not received a diploma represent 2.2 percent of the interior designers. One interior designer with a doctorate (.4 percent) is among the sample (see Table I).

Years of Practice

A close distribution is found between the designers having 10 to 20 years of practice (38.2 percent) and over 20 years of practice (39.3 percent). These are followed by the group representing over 20 years of interior design practice (20 percent). Only 2.5 percent of the respondents has been in the interior design practice for less than five years (see Table II).

Type of Practice

All the professional designers who responded to the questionnaire

TABLE II

CHARACTERISTICS OF PROFESSIONAL PRACTICES
OF THE POPULATION

Characteristic	Number	Percent
Years of Practice		
under 5 years	7	2.5
5 to 10 years	56	20.0
10 to 20 years	107	38.2
over 20 years	110	39.3
Principal Practice		
commercial	55	19.5
residential	125	44.3
commercial/residential	86	30.5
educational	9	3.2
other	7	2.5
Percentage of Use of Imported Merchandise		
0 to 24	166	59.1
25 to 49	95	38.8
50 to 74	17	6.1
75 to 100	3	1.1

are engaged in employment directly related to interior design. The largest number of respondents (44.3 percent) is in residential practice. Thirty-five percent of the designers is involved in a combination of commercial and residential practice, while 19.5 percent of the designers limit their practice to commercial design. Only nine (3.2 percent) of the 282 interior designers who responded to the questionnaire are now working in a totally educational capacity. Other types of employment are represented by seven (2.5 percent) of the interior designers in the study. These are health care, restoration, fast food stores, recreational vehicles, criminal justice architecture, federal government, and display (see Table II).

Use of Imported Merchandise

The number of responses among the sample population decreases as the percent of use of imported merchandise increases. The largest number (59.1 percent) of interior designers use zero to 24 percent imported merchandise in their practice followed by 38.8 percent who uses 25 to 49 percent imported merchandise. At 50 to 74 percent level of imported merchandise, a drop of 6.1 percent is noted. This leaves only 1.1 percent who uses 75 to 100 percent imported merchandise (see Table II).

Part 2--Responses Related to Objectives

Three objectives are considered by this study as stated on page three. Frequency counts and percentages are obtained from responses of the interior designers to the questionnaire. The score which occurs most frequently is the indicator of feelings and preferences related to

the objectives.

Objective I: Identify To What Extent Metric Units Are Currently Being Used in the Interior Design Industry

The extent of use of the metric system by interior designers is based on reactions to questions 17 and 18 (see Appendix D). Eighty-six percent of the respondents is not using the metric units and standards. Of the interior designers who are using the metric system, 18 percent of the designers uses the system 50 to 74 percent, 2.4 percent of the designers uses the system 24 to 49 percent, and 96.8 percent of the designers uses the metric system none to 24 percent. Only 1.1 percent of the interior designers uses the metric system 75 to 100 percent in their business.

Objective II: Assess Attitudes Among Interior Designers Toward Change to the Metric System

Attitude toward change to the metric system by interior designers is based on questions 19, 20-26, 27, 36, and 44-47 from the instrument (see Appendix D). The interior designers responses are very close on their attitude toward anticipated change to the metric system (see Appendix D, question 19). Fifty-five percent of the interior designers anticipate change while 45 percent of the designers does not anticipate change to the metric system.

The effects anticipated by change to the metric system are analyzed according to rank order by frequency of responses (see Appendix D, questions 20-26). As seen in Table III the largest number of interior

designers feel that the metric system "would take time to get use to it." This is followed by training of employees and dual dimensioning as effects of anticipated change to the metric system. Only 14 respondents feel that change to the metric system would have no effect on the interior design business. The designers stating other effects than those listed identify the effects of confusion and cost.

TABLE III

EFFECTS OF CHANGE TO THE METRIC SYSTEM ANTICIPATED BY INTERIOR DESIGNERS

Rank	Effect on the Company	Number
1	Would take time to get use to it	182
2	Time for training of employees	90
3	Dual dimensioning	87
4	Waste due to incorrect measurement	63
5	Don't know	22
6	Not at all	14
7	Other	4

As seen in Table IV, 38 percent of the interior designers anticipate change to the metric system between 1978 and 1980 and 37 percent of the designers anticipate change beyond 1980 (see Appendix D, question 27). Twenty-two percent of the respondents feel they will never change to the metric system. Only three percent of the interior

designers anticipate change to the metric system in 1977.

TABLE IV

ANTICIPATED DATE OF CHANGE TO THE METRIC SYSTEM BY INTERIOR DESIGNERS

Date	Number	Percent
1977	7	3
1978 to 1980	98	38
beyond 1980	95	37
never	56	22

Responses to the questionnaire indicate that 83 percent of the interior designers does not feel prepared to change to the metric system (see Appendix D, question 36). Seventeen percent of the respondents feels that they are prepared to change from their present system to the metric system.

The suggestions for implementation of the metric system are analyzed according to rank order by frequency of responses. As seen in Table V, the largest number of interior designers feel that education is the best tool for implementation. The implementation method of education and training is followed by implementation through changes in operational practices and purchasing of equipment. The designers listing other types of implementation methods than those stated a need for conversion, a need to "respond as industry responds", and a need

to become "fluent with the system".

TABLE V

METHODS OF IMPLEMENTATION TO THE METRIC SYSTEM PREFERRED BY INTERIOR DESIGNERS

Rank	Method of Implementation	Number
1	Education and training	188
2	Change operational practices	106
3	Purchase equipment	86
4	Other	16

Objective III: Identify the Preferred Method For Receiving Metric Education and Which Employees Would Benefit

Identification of who should receive metric instruction and how the metric education should be conducted is based on questions 28-34 and 37-43 from the instrument (see Appendix D). Rank order of who would benefit from metric education is included in Table VI (see Appendix D, questions 28-34). Interior designers feel that draftsmen, installers, and designers will benefit the most from metric education in the interior design industry. This is followed by metric instruction for secretaries and receptionists. The designers listing other persons who would benefit from metric education listed estimating personnel,

workroom personnel, and salespeople.

TABLE VI

EMPLOYEES IN THE INTERIOR DESIGN BUSINESS WHO WOULD BENEFIT FROM METRIC EDUCATION

Rank	Employee	Number
1	Draftsmen	167
2	Installers	160
3	Associate Designers	156
4	Assistant Designers	154
5	Secretaries	69
6	Other	50
7	Receptionist	29

The preferred methods for receiving metric education are analyzed according to rank order by frequency of responses in Table VII (see Appendix D, questions 37-43). Self-instruction and a workshop for interior designers are the two most favored methods of receiving metric education. These methods of receiving metric education are preferred almost two to one over the other suggested instructional techniques. Television and correspondence courses as methods of receiving metric education receive the fewest responses.

TABLE VII

PREFERRED METHOD FOR RECEIVING METRIC EDUCATION AMONG PROFESSIONAL INTERIOR DESIGNERS

Rank	Method of Instruction	Number
1	Self-Instruction	133
2	Design workshop	130
3	Night class	74
4	Week-end workshop	48
5	Television course	22
6	Correspondence course	11
7	Other	10

Part 3--Attitude Toward Areas of Emphasis in Metric Education

The data to analyze the attitude toward areas of emphasis that might be of greatest value to interior designers in metric education are obtained from questions 50 through 59 of the instrument (see Appendix D). These questions are organized as a Likert scale. This technique is used to assess attitudes by producing a numerical value from the responses (Fishbein, 1967).

The areas of emphasis are ranked in order from strongly agree to undecided according to the mean scores (see Table VIII). Scale drawing, as a part of metric education, is designated as first priority with a mean of 1.23 (strongly agree), while the history of the metric system

ranks last with a mean of 3.24 (undecided). Three of the areas of emphasis receive a rating of strongly agree, and the remaining three areas of emphasis receive a rating of undecided. None of the areas of emphasis receive a rating of disagree or strongly disagree.

TABLE VIII

RANKING OF AREAS OF EMPHASIS TO BE INCLUDED IN METRIC EDUCATION ACCORDING TO MEAN SCORES

Areas of Emphasis	Rank	Question	Sample Mean	Range
Scale drawing	1	52	1.23	1.5 - below strongly agree
Length measurement	2	55	1.40	
Illumination	3	59	1.48	
Conversion techniques	4	53	1.84	1.6 - 2.5 agree
Metric abbreviation	5	50	2.28	
Decimal arithmetic	6	51	2.31	
Temperature	7	58	2.49	
Weight measurement	8	56	2.63	2.6 - 3.5 undecided
Volume measurement	9	57	2.64	
History of metrics	10	54	3.24	

In completing the attitude scale, respondents made the following comments on the questionnaire:

1. "We are all busy enough too have to learn something else."

2. "There is no possible way of ever changing."

Analysis of the hypotheses related to attitude toward areas of emphasis in metric education is presented according to geographic, personal, and professional variables. The F scores and their associated probabilities are identified. When a significant difference is shown, the Duncan's Multiple Range is used to determine which of the differences among the variable means are significant and which are not.

Geographic Variable

Hypothesis one states that there is no significant difference in attitude toward areas of emphasis in metric education by interior designers among regions designated by A.S.I.D. In order to test the hypotheses pertaining to the geographic variable of interior designers, the analysis of variance has been calculated.

The results of the analysis of variance of the significant difference between attitude toward areas of metric education emphasis and region are given in Table IX. No significant differences are identified among any of the areas of emphasis that could be included as a part of metric education. Question 59, related to the area of illumination as a part of metric education, came near to a probability of .05 with an F score of 1.83 at the .06 level of probability. To be significant at the .05 level of probability an F score of 1.88 is needed. The hypothesis that there is no significant difference in attitude toward areas of emphasis in metric education by interior designers among regions designated by A.S.I.D. is accepted.

TABLE IX

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND REGION OF A.S.I.D.

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviations					
Between Region	9	13.46	1.50	1.04	0.41
Within Sample	262	375.30	1.43		
51 - Decimal Arithmetic					
Between Region	9	13.37	1.49	1.23	0.28
Within Sample	258	312.30	1.21		
52 - Scale Drawing					
Between Region	9	1.70	0.19	0.60	0.80
Within Sample	266	83.46	0.31		
53 - Conversion Technique					
Between Region	9	8.22	0.91	0.86	0.56
Within Sample	265	280.74	1.06		
54 - History of Metrics					
Between Region	9	11.08	1.23	1.20	0.30
Within Sample	261	268.33	1.03		
55 - Length Measurement					
Between Region	9	2.35	0.26	0.54	0.84
Within Sample	268	128.53	0.48		
56 - Weight Measurement					
Between Region	9	17.20	1.91	1.50	0.15
Within Sample	263	334.20	1.27		
57 - Volume Measurement					
Between Region	9	4.25	0.47	0.37	0.95
Within Sample	259	333.20	1.29		
58 - Temperature					
Between Region	9	10.98	1.22	1.13	0.34
Within Sample	262	283.01	1.08		
59 - Illumination					
Between Region	9	5.77	0.64	1.83	0.06
Within Sample	265	92.83	0.35		

$p < .05$

Personal Variables

Hypothesis two states that there is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected personal variables (sex, age, and educational background). In order to test the hypothesis pertaining to the three personal variables of interior designers, the analysis of variance has been utilized.

Sex. Analysis of the difference between attitude toward areas of emphasis in metric education and sex of interior designers is shown in Table X. The obtained F scores of 4.1 and 5.1 in the areas of length measurement (question 55) and weight measurement (question 56) as a part of metric education are significant at the .04 and .02 levels of probability respectively.

Data obtained from the summary of interior designers responses to the attitude scale by the sex are presented in Table XXXIX, Appendix H. It can be noted that both male and female respondents rank question 55, related to the importance of length measurement as a part of metric education, as second. However females with a mean of 1.31 express a more favorable attitude toward including length measurement in metric education than males with a mean of 1.47. Both males and females rank question 56, related to the importance of weight measurement as a part of metric education, among their last three responses. Females with a mean of 2.47 again express a more favorable attitude toward including weight measurement in metric education than males with a mean of 2.78. The data indicate that attitude toward the importance of metric abbreviation, decimal arithmetic, scale drawing, conversion technique,

TABLE X

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND SEX

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviations					
Between Sexes	1	0.11	0.11	0.08	0.78
Within Sample	265	380.01	1.43		
51 - Decimal Arithmetic					
Between Sexes	1	0.88	0.88	0.73	0.60
Within Sample	261	315.55	1.21		
52 - Scale Drawing					
Between Sexes	1	0.84	0.84	2.69	0.10
Within Sample	269	84.05	0.31		
53 - Conversion Technique					
Between Sexes	1	0.002	0.002	0.002	0.96
Within Sample	268	282.83	1.05		
54 - History Metrics					
Between Sexes	1	0.03	0.03	0.03	0.85
Within Sample	264	274.43	1.04		
55 - Length Measurement					
Between Sexes	1	1.84	1.84	4.10*	0.04
Within Sample	271	121.23	0.45		
56 - Weight Measurement					
Between Sexes	1	6.46	6.46	5.12*	0.02
Within Sample	266	335.43	1.26		
57 - Volume Measurement					
Between Sexes	1	2.80	2.80	2.27	0.13
Within Sample	262	323.73	1.24		
58 - Temperature					
Between Sexes	1	0.91	0.91	0.83	0.63
Within Sample	265	291.84	1.10		
59 Illumination					
Between Sexes	1	0.57	0.57	1.58	0.21
Within Sample	2.68	96.84	0.36		

*Significant at the $p < .05$

history of the metric system, volume measurement, temperature, and illumination as a part of metric education are not significantly affected by the sex of the interior designer.

Age. The results of the analysis of variance of the difference between attitude toward areas of emphasis in metric education and age of interior designers are given in Table XI. The areas of conversion technique, weight measurement, and illumination as a part of metric education, with obtained F scores of 3.4, 5.9, and 4.9, are significant at the .02, .001, and .003 levels of probability respectively.

The directions of the significant differences between attitude toward areas of emphasis in metric education and age groups are obtained through the use of the Duncan's Multiple Range test. Significant differences are indicated by means not grouped by the same letter.

As seen in Table XII, the significant difference calculated by the F test between attitude toward the importance of weight measurement as a part of metric education and age groups is found between four groupings. Interior designers over 60 years of age with a mean of 3.07 and designers 45 to 60 years of age with a mean of 2.85 consider the area of weight measurement as a part of metric education to be significantly less important than designers 30 to 45 years of age with a mean of 2.46 and designers under 30 years of age with a mean of 2.04. As the age of the interior designer increases the inclusion of weight measurement in metric education becomes less desirable.

As seen in Table XIII, the significant difference calculated by the F test between attitude toward the importance of conversion technique as a part of metric education and age groups is found between three groupings. Interior designers under 30 years of age with a mean

TABLE XI

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND AGE GROUPS

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviation					
Between Age Groups	3	7.29	2.43	1.70	0.17
Within Sample	267	381.40	1.43		
51 - Decimal Arithmetic					
Between Age Groups	3	0.95	0.32	0.26	0.86
Within Sample	263	324.63	1.23		
52 - Scale Drawing					
Between Age Groups	3	0.98	0.33	1.06	0.37
Within Sample	271	84.12	0.31		
53 - Conversion Technique					
Between Age Groups	3	10.57	3.52	3.43*	0.02
Within Sample	270	277.68	1.03		
54 - History of Metrics					
Between Age Groups	3	3.66	1.22	1.18	0.32
Within Sample	266	275.17	1.03		
55 - Length Measurement					
Between Age Groups	3	2.26	0.75	1.60	0.19
Within Sample	273	128.45	0.47		
56 - Weight Measurement					
Between Age Groups	3	21.79	7.26	5.91*	0.001
Within Sample	268	329.18	1.23		
57 - Volume Measurement					
Between Age Groups	3	3.70	1.23	0.98	0.60
Within Sample	264	333.34	1.26		
58 - Temperature					
Between Age Groups	3	7.75	2.58	2.41	0.09
Within Sample	267	285.98	1.07		
59 - Illumination					
Between Age Groups	3	5.12	1.71	4.94*	0.003
Within Sample	270	93.20	0.35		

*Significant at the $p < .05$

TABLE XII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF WEIGHT MEASUREMENT IN METRIC EDUCATION AND AGE GROUPS

Age Groups	Mean	Number	Groupings		Significant Differences
Over 60 years	3.07	27	A		* * *
45 to 60 years	2.85	106	A		* *
30 to 45 years	2.46	116		B	*
Under 30 years	2.04	23		B	*

df 268
Mean square 1.23
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

TABLE XIII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF CONVERSION TECHNIQUE IN METRIC EDUCATION AND AGE GROUPS

Age Groups	Mean	Number	Groupings		Significant Differences
Over 60 years	2.21	28	A		*
45 to 60 years	1.86	108	A		*
30 to 45 years	1.84	115	A		*
Under 30 years	1.30	23		B	* * *

df 270
Mean square 1.03
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

of 1.30 consider conversion technique as a part of metric education significantly more important than designers 30 to 45 years of age with a mean of 1.85, and designers 45 to 60 years of age with a mean of 1.86, and designers over 60 years of age with a mean of 2.21. As the age of the interior designer increases the inclusion of conversion technique in metric education becomes less desirable.

As seen in Table XIV, the significant difference calculated by the F test between attitude toward the importance of the area of illumination as a part of metric education and age groups is found between two groups. Interior designers under 30 years of age with a mean of 1.09 consider the area of illumination as a part of metric education significantly more important than designers 45 to 60 years of age with a mean of 1.46 and designers 30 to 45 years of age with a mean of 1.59. Interior designers under 30 years of age with a mean of 1.09 and over 60 years of age with a mean of 1.39 do not significantly differ concerning the area of illumination as a part of metric education

The data in Table XI indicates the areas of emphasis in metric education that are not significantly affected by the age of the interior designers. These are: metric abbreviation, decimal arithmetic, scale drawing, history of the metric system, length measurement, volume measurement, and temperature.

Educational Background. The results of the analysis of variance of the difference between attitude toward areas of emphasis in metric education and educational background of interior designers are given in Table XV. None of the F score values is significant at the .05 level. The data indicate that attitude toward areas of emphasis in metric education is not significantly affected by educational background

of interior designers.

TABLE XIV

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF ILLUMINATION IN METRIC EDUCATION AND AGE GROUPS

Age Groups	Mean	Number	Groupings		Significant Differences	
30 to 45 years	1.59	116	A		*	
45 to 60 years	1.46	107	A			*
Over 60 years	1.39	28		B		
Under 30 years	1.09	23		B	*	*

df 270
Mean square 0.35
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

Even though no significant differences are found due to the variable educational background, significant differences are found among the other personal variables of sex and age. Therefore, the hypotheses that there is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected personal variables (sex, age, and educational background) is not accepted.

Professional Variables

Hypothesis three states that there is no significant difference in attitude toward areas of emphasis in metric education by interior

TABLE XV

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND EDUCATIONAL BACKGROUND

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviation					
Between Education	6	1.22	0.20	0.14	0.99
Within Sample	260	376.71	1.45		
51 - Decimal Arithmetic					
Between Education	6	2.59	0.43	0.34	0.91
Within Sample	256	322.59	1.26		
52 - Scale Drawing					
Between Education	6	2.09	0.35	1.12	0.35
Within Sample	263	82.21	0.31		
53 - Conversion Technique					
Between Education	6	7.06	1.18	1.14	0.34
Within Sample	262	269.74	1.03		
54 - History of Metrics					
Between Education	6	7.14	1.19	1.18	0.32
Within Sample	258	260.43	1.01		
55 - Length Measurement					
Between Education	6	3.14	0.52	1.10	0.36
Within Sample	265	126.37	0.48		
56 - Weight Measurement					
Between Education	6	9.76	1.63	1.25	0.28
Within Sample	260	337.24	1.30		
57 - Volume Measurement					
Between Education	6	9.27	1.55	1.23	0.29
Within Sample	256	322.24	1.26		
58 - Temperature					
Between Education	6	7.61	1.27	1.18	0.32
Within Sample	259	258.86	1.03		
59 - Illumination					
Between Education	6	1.79	0.30	0.82	0.56
Within Sample	262	95.35	0.36		

$p < .05$

designers and selected professional variables (years of practice, use of imported merchandise, and type of practice). In order to test the hypothesis pertaining to the three professional variables of interior designers, the analysis of variance is calculated.

Years of Practice. The results of the analysis of variance of the difference between attitude toward areas of emphasis in metric education and years of practice of interior designers are given in Table XVI. The areas of length measurement, weight measurement, and illumination as a part of metric education are significant with obtained F scores of 4.5, 5.9, and 2.9 at the .005, .001, and .04 levels of probability respectively.

The direction of the significant difference between the attitude toward areas of emphasis in metric education and years of practice is obtained through the use of the Duncan's Multiple Range test. Significant differences are identified by means not grouped by the same letter.

As seen in Table XVII, the significant difference calculated by the F test between the attitude toward the importance of length measurement as a part of metric education and years of practice is found between two groupings. Interior designers in practice over 20 years are significantly less favorable with a mean of 1.58 to having metric education concerned with length measurement than designers in practice 10 to 20 years with a mean of 1.34 and 5 to 10 years with a mean of 1.20. The interior designers who had been in practice for less than five years with a mean of 1.43 did not significantly differ from any of the other groupings.

TABLE XVI

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND YEARS OF PRACTICE

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviation					
Between Practice	3	9.28	3.09	2.18	0.09
Within Sample	266	377.76	1.43		
51 - Decimal Arithmetic					
Between Practice	3	4.00	1.34	1.09	0.35
Within Sample	262	319.84	1.22		
52 - Scale Drawing					
Between Practice	3	1.08	0.36	1.16	0.33
Within Sample	270	83.97	0.31		
53 - Conversion Technique					
Between Practice	3	7.99	2.66	2.56	0.06
Within Sample	269	279.57	1.04		
54 - History of Metrics					
Between Practice	3	1.27	0.42	0.41	0.75
Within Sample	265	276.03	1.04		
55 - Length Measurement					
Between Practice	3	6.15	2.05	4.48*	0.005
Within Sample	272	124.40	0.46		
56 - Weight Measurement					
Between Practice	3	21.68	7.23	5.89*	0.001
Within Sample	267	327.42	1.23		
57 - Volume Measurement					
Between Practice	3	3.63	1.21	9.96	0.58
Within Sample	263	332.98	1.27		
58 - Temperature					
Between Practice	3	5.67	1.89	1.75	0.16
Within Sample	266	287.81	1.08		
59 - Illumination					
Between Practice	3	3.08	1.03	2.90*	0.04
Within Sample	269	95.02	0.35		

*Significant at the $p < .05$

TABLE XVII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF LENGTH MEASUREMENT IN METRIC EDUCATION AND YEARS OF PRACTICE

Years of Practice	Mean	Number	Grouping		Significant Differences	
Over 20 years	1.58	107	A		*	*
Under 5 years	1.43	7	A	B		
10 to 20 years	1.34	106		B		*
5 to 10 years	1.20	56		B	*	

df 272
Mean square 0.46
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

As seen in Table XVIII, the significant difference calculated by the F test between attitude toward the area of weight measurement as a part of metric education and years of practice is found between two groupings. Designers who had been in practice 5 to 10 years are significantly more favorable to metric education concerned with weight measurement with a mean of 2.11 than interior designers in practice 10 to 20 years with a mean of 2.7 and over 20 years with a mean of 2.86. The interior designers who have been in practice for less than 5 years with a mean of 2.43 did not significantly differ from any of the other groupings.

As seen in Table XIX, the significant difference calculated by the F test between attitude toward the area of illumination as a part of metric education and years of practice is not identified. The Duncan's Multiple Range test takes into consideration the sample size.

TABLE XVIII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTTITUDE TOWARD THE AREA OF WEIGHT MEASUREMENT IN METRIC EDUCATION AND YEARS OF PRACTICE

Years of Practice	Mean	Number	Grouping		Significant Differences	
Over 20 years	2.86	103	A		*	
10 to 20 years	2.70	105	A			*
Under 5 years	2.43	7	A	B		
5 to 10 years	2.11	56		B	*	*

df 267
Mean square 1.23
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

TABLE XIX

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF ILLUMINATION IN METRIC EDUCATION AND YEARS OF PRACTICE

Years of Practice	Mean	Number	Grouping	Significant Differences
Under 5 years	1.57	7	A	
10 to 20 years	1.53	105	A	
Over 20 years	1.52	105	A	
5 to 10 years	1.27	56	A	

df 269
Mean square 0.35
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

Therefore, the small number of respondents (7) who have been in practice for less than five years cause the difference to be nonsignificant.

The data in Table XVI indicate the areas of emphasis in metric education that are not significantly affected by the number of years of practice of the interior designers. These are: metric abbreviation, decimal arithmetic, scale drawing, conversion technique, history of the metric system, volume measurement, and temperature.

Use of Imported Merchandise. Data obtained from the analysis of variance of the difference between attitude toward areas of emphasis in metric education and use of imported merchandise is presented in Table XX. The areas of scale drawing and length measurement as a part of metric education are significant with F scores of 4.3 and 3.0 at the .006 and .03 levels of probability respectively.

The direction of the significant difference between the attitude toward areas of emphasis in metric education and use of imported merchandise is obtained through the use of the Duncan's Multiple Range test. Significant differences are identified by means not grouped by the same letter.

As seen in Table XXI, the significant difference calculated by the F test between the attitude toward the area of scale drawing as a part of metric education and use of imported merchandise is found between three groupings. Interior designers using 75 to 100 percent imported merchandise with a mean of 2.33 are significantly less favorable to having metric instruction concerned with scale drawing than designers using 25 to 49 percent imports with a mean of 1.25, designers using 0 to 24 percent imports with a mean of 1.21, and those using 50 to 74 percent imports with a mean of 1.13.

TABLE XX

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND USE OF IMPORTED MERCHANDISE

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviation					
Between Merchandise	3	4.36	1.45	1.01	0.39
Within Sample	267	383.88	1.44		
51 - Decimal Arithmetic					
Between Merchandise	3	0.02	0.01	0.004	0.99
Within Sample	263	325.18	1.24		
52 - Scale Drawing					
Between Merchandise	3	3.86	1.29	4.30*	0.006
Within Sample	271	81.24	0.30		
53 - Conversion Technique					
Between Merchandise	3	5.97	1.99	1.91	0.13
Within Sample	270	281.64	1.04		
54 - History of Metrics					
Between Merchandise	3	0.27	0.09	0.09	0.97
Within Sample	266	279.09	1.05		
55 - Length Measurement					
Between Merchandise	3	4.20	1.40	3.02*	0.03
Within Sample	273	126.51	0.46		
56 - Weight Measurement					
Between Merchandise	3	4.61	1.54	1.19	0.31
Within Sample	268	346.62	1.29		
57 - Volume Measurement					
Between Merchandise	3	0.70	0.23	0.18	0.91
Within Sample	264	336.63	1.28		
58 - Temperature					
Between Merchandise	3	2.40	0.80	0.73	0.54
Within Sample	267	291.33	1.09		
59 - Illumination					
Between Merchandise	3	2.63	0.88	2.47	0.06
Within Sample	270	95.74	0.36		

*Significant at the $p < .05$

TABLE XXI

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF SCALE DRAWING IN METRIC EDUCATION AND USE OF IMPORTED MERCHANDISE

Percent of Use of Imported Merchandise	Mean	Number	Grouping	Significant Differences
75 to 100	2.33	3	A	* * *
25 to 49	1.25	93	B	*
0 to 24	1.21	164	B	*
50 to 74	1.13	15	B	*

df 271
Mean square 0.30
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

As seen in Table XXII, the significant difference calculated by the F test between the attitude toward the area of length measurement as a part of metric education and use of imported merchandise is found between three groupings. Interior designers using 75 to 100 percent imported merchandise with a mean of 2.33 are significantly less favorable to having metric instruction concerned with length measurement than designers using 25 to 49 percent imports with a mean of 1.48, designers using zero to 24 percent imports with a mean of 1.36, and those using 50 to 74 percent imports with a mean of 1.19.

The data in Table XX indicate the areas of emphasis in metric education that are not significantly affected by the use of imported merchandise among interior designers. These are: metric abbreviation, decimal arithmetic, conversion technique, history of the metric system,

weight measurement, volume measurement, temperature, and illumination.

TABLE XXII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF LENGTH MEASUREMENT IN METRIC EDUCATION AND USE OF IMPORTED MERCHANDISE

Percent of Use of Imported Merchandise	Mean	Number	Grouping	Significant Differences		
75 to 100	2.33	3	A	*	*	*
25 to 49	1.48	93	B	*		
0 to 25	1.36	165	B		*	
50 to 74	1.19	16	B			*

df 273
Mean square 0.46
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

Type of Practice. The results of the analysis of variance of the difference between attitude toward areas of emphasis in metric education and type of practice among interior designers are given in Table XXIII. An obtained F score of 3.34 in the area of illumination as a part of metric education is significant at the .02 level of probability. The data indicate that attitude toward metric abbreviation, decimal arithmetic, scale drawing, conversion technique, history of the metric system, length measurement, weight measurement, volume measurement, and temperature as a part of metric education are not significantly affected

TABLE XXIII

ANALYSIS OF VARIANCE BETWEEN ATTITUDE TOWARD AREAS OF EMPHASIS IN METRIC EDUCATION AND TYPE OF PRACTICE

Source of Variation	df	Sum of Squares	Mean Square	F	p
50 - Metric Abbreviation					
Between Practice	3	3.91	1.30	0.90	0.56
Within Sample	261	378.33	1.45		
51 - Decimal Arithmetic					
Between Practice	3	0.91	0.30	0.25	0.87
Within Sample	257	317.70	1.24		
52 - Scale Drawing					
Between Practice	3	1.99	0.67	2.14	0.09
Within Sample	265	82.25	0.31		
53 - Conversion Technique					
Between Practice	3	4.81	1.60	1.54	0.20
Within Sample	264	275.29	1.04		
54 - History of Metrics					
Between Practice	3	0.42	0.14	0.14	0.94
Within Sample	260	268.06	1.03		
55 - Length Measurement					
Between Practice	3	2.66	0.89	1.88	0.13
Within Sample	267	126.10	0.47		
56 - Weight Measurement					
Between Practice	3	6.68	2.23	1.72	0.16
Within Sample	262	338.39	1.29		
57 - Volume Measurement					
Between Practice	3	2.31	0.77	0.61	0.62
Within Sample	258	327.68	1.27		
58 - Temperature					
Between Practice	3	3.32	1.11	1.02	0.39
Within Sample	261	282.93	1.08		
59 - Illumination					
Between Practice	3	3.54	1.18	3.34*	0.02
Within Sample	264	93.28	0.35		

*Significant at the $p < .05$

by the type of practice of the interior designer.

As seen in Table XXIV, the significant difference calculated by the F test between attitude toward the area of illumination as a part of metric education and type of practice is found between three groupings. Interior designers in residential practice with a mean of 1.64 consider the area of illumination as a significantly less important part of metric education than commercial designers with a mean of 1.41, designers combining commercial and residential practice with a mean of 1.40, and designers in educational capacities with a mean of 1.33.

TABLE XXIV

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN ATTITUDE TOWARD THE AREA OF ILLUMINATION IN METRIC EDUCATION AND TYPE OF PRACTICE

Type of Practice	Mean	Number	Grouping	Significant Differences
Residential	1.64	84	A	* * *
Commercial	1.41	54	B	*
Residential and Commercial	1.40	121	B	*
Educational	1.33	9	B	*

df 264
Mean square 0.35
$p < .05$

Mean Range: 1=high attitude score
5=low attitude score

Significant differences are found among all the professional variables of years of practice, use of imported merchandise, and type of

practice. Therefore the hypothesis that there is no significant difference in attitude toward areas of emphasis in metric education between interior designers and selected professional variables (years of practice, use of imported merchandise, and type of practice) is not accepted.

Part 4--Comprehension of the Metric System

The data to analyze the comprehension of the metric system have been obtained from questions 63 through 71 of the instrument (see Appendix D). Of the 282 questionnaires returned 35 designers (12.4 percent) did not respond to this section of the instrument. Failure to respond to questions is scored as a zero and calculated as a part of the sample mean.

Reasons for deletion of the questions by respondents included:

1. "I do not have the time for this and do not know the metric system."
2. "I have not tried to learn the metric system therefore I will not answer these questions."
3. "I wouldn't even attempt to answer this without study."
4. "Can't answer any of these."

Some of the respondents who did answer the questions also made comments as follows:

1. "This has been done from ignorant recollection."
2. "All guessed."
3. "This is a near void suit in my hand. I will need the full course in preparing for the metric system."

One respondent admits, "I looked in the dictionary for seven of the ten answers."

Analysis of the hypothesis related to comprehension of the metric system is presented according to geographic, personal, and professional variables. The F scores and their associated probabilities are identified. When a significant difference occurs, the Duncan's Multiple Range is used to determine which of the differences among the variables means are significant and which are not.

Geographic Variables

Hypothesis four states that there is no significant difference in comprehension of the metric system by interior designers among regions designated by A.S.I.D. In order to test the hypothesis pertaining to the geographic variable of interior designers, the analysis of variance has been utilized.

Data obtained from the analysis of variance of the difference between comprehension of the metric system and geographic region are presented in Table XXV. The F score value of 1.39 is not significant at the .05 level. It must be concluded that metric comprehension is not significantly affected by regional location.

Out of a possible score of 10, the population mean is 5.76 (see Table XXXVIII, Appendix H). The West Central region has received the highest score of 6.5, while the East Central region scored the lowest with 4.5.

The hypothesis that there is no significant difference in comprehension of the metric system by interior designers among regions designated by A.S.I.D. is accepted.

TABLE XXV

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND REGION

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Region	9	79.75	8.86	1.39	0.19
Within Sample	272	1740.37	6.40		

$p < .05$

Personal Variables

Hypothesis five states that there is no significant difference in comprehension of the metric system by interior designers and selected personal variables (sex, age, and educational background). In order to test the hypothesis pertaining to the three personal variables of interior designers the analysis of variance has been utilized.

Sex. The results of the analysis of variance of the difference between comprehension of the metric system and sex of interior designers are given in Table XXVI. The F score value of .15 is not significant at the .05 level. The data indicate that comprehension of the metric system is not significantly affected by the sex of interior designers.

Age. Data obtained from the analysis of variance of the difference between comprehension of the metric system and age are presented in Table XXVII. The findings indicate that age groups significantly affect comprehension of the metric system. The F value of 3.55 is

significant at the .02 level of probability (Table XXVII).

TABLE XXVI

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND SEX

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Sexes	1	0.97	0.97	0.15	0.70
Within Sample	275	1772.24	6.45		

$p < .05$

TABLE XXVII

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND AGE

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Age Groups	3	67.14	22.38	3.55*	0.02
Within Sample	277	1747.92	6.31		

*Significant at the $p < .05$

Data obtained from the summary of interior designer's metric comprehension by age are presented in Table XL, Appendix H. It can be noted that as the age of the interior designer increases, the score

for metric comprehension decreases. To confirm this visual impression a correlation coefficient is calculated to varify a direct measure of relation. If one has done an analysis of variance, a simple coefficient is yielded by the following formula (Kerlinger, 1973).

$$E = \sqrt{\frac{SSb}{SSt}}$$

SSb and SSt are the between group sum of squares and the total sum of squares, respectively. The data are taken directly from the analysis of variance (see Table XXVII) to calculate the coefficient. Even though a relation is inferred from the significant difference between the means, the correlation coefficient reveals strength or magnitude to the finding (Kerlinger, 1973). The tabulated correlation coefficient of -0.18 is significant at the .002 level of probability. There is a significant inverse relationship between the age of the interior designer and the comprehension of the metric system.

The direction of the significant difference between comprehension of the metric system and age groups is obtained through the use of Duncan's Multiple Range test. Significant differences are identified by means not grouped by the same letter.

As seen in Table XXVIII, the significant difference calculated by the F test between comprehension of the metric system and age groups is found between three groupings. Interior designers under 30 years of age with a mean of 6.91 have a significantly higher metric comprehension score than designers 45 to 60 years of age with a mean of 5.63 and designers over 60 years of age with a mean of 4.75. Interior designers 30 to 45 years of age with a mean of 5.90 also have a significantly higher metric comprehension score than designers over 60 years of age with a mean of 4.75.

TABLE XXVIII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND AGE

Age	Mean	Number	Grouping			Significant Differences		
Under 30 years of age	6.91	23	A			*	*	
30 to 45 years of age	5.90	117	A	B				*
45 to 60 years of age	5.63	109		B	C	*		
Over 60 years of age	4.75	32			C		*	*

df 277
Mean square 6.31
$p < .05$

Mean Range: 10=high score
0=low score

Educational Background. The results of the analysis of variance of the difference between comprehension of the metric system and educational background of interior designers is given in Table XXIX. The F score value of 1.09 is not significant at the .05 level. The data indicate that comprehension of the metric system is not significantly affected by educational background of interior designers.

Even though no significant differences are found due to the variables sex and educational background, a significant difference is found among the personal variable of age. Therefore the hypothesis that there is no significant difference in comprehension of the metric system by interior designers and selected personal variables (age, sex, and educational background) is not accepted.

TABLE XXIX

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND EDUCATIONAL BACKGROUND

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Background	6	41.84	6.97	1.09	0.37
Within Sample	269	1727.41	6.42		

$p < .05$

Professional Variables

Hypothesis six states that there is no significant difference in comprehension of the metric system by interior designers and selected professional variables (years of practice, use of imported merchandise, type of practice). In order to test the hypothesis pertaining to the three professional variables of interior designers, the analysis of variance has been utilized.

Years of Practice. The results of the analysis of variance of the difference between metric comprehension and years of practice are given in Table XXX. A significant difference exists between metric comprehension and years of practice. An F score value of 3.63 with an associated probability of .01 is identified.

Data obtained from the summary of interior designer's metric comprehension by years of practice is presented in Table XLVII, Appendix H. It can be noted that as the years of practice increase, the score

for metric comprehension decreases. To confirm this visual impression a correlation coefficient is calculated to verify a direct measure of relation. If one has done an analysis of variance, a simple coefficient is yielded by the following formula (Kerlinger, 1973).

$$E = \sqrt{\frac{SSb}{SSt}}$$

SSb and SSt are the between group sum of squares and the total sum of squares, respectively. The data are taken directly from the analysis of variance (see Table XXX) to calculate the coefficient. Even though a relation is inferred from the significant difference between the means the correlation coefficient reveals strength or magnitude to the findings (Kerlinger, 1973). The tabulated correlation coefficient of -.20 is significant at the .001 level of probability. There is a significant inverse relationship between the years of practice in interior design and comprehension of the metric system.

TABLE XXX

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND YEARS OF PRACTICE

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Years	3	68.71	22.90	3.63*	0.01
Within Sample	276	1739.26	6.30		

*Significant at the $p < .05$

The direction of the significant difference between comprehension of the metric system and years of practice calculated by the F test is not identified (see Table XXXI). The Duncan's Multiple Range test takes into consideration the sample size. Therefore, the small number of respondents (7) who have been in practice for less than five years cause the difference to be nonsignificant.

TABLE XXXI

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND YEARS OF PRACTICE

Years of Practice	Mean	Number	Grouping	Significant Difference
Under 5 years	7.00	7	A	
5 to 10 years	6.46	56	A	
10 to 25 years	5.79	107	A	
Over 20 years	5.24	110	A	

df 276
Mean square 6.30
$p < .05$

Mean Range: 10=high score
0=low score

Use of Imported Merchandise. Data obtained from the analysis of variance of the difference between comprehension of the metric system and use of imported merchandise are presented in Table XXXII. The findings indicate that use of imported merchandise significantly affects comprehension of the metric system. The obtained F score of

3.21 is significant at the .02 level of probability.

TABLE XXXII

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND USE OF IMPORTED MERCHANDISE

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Import Use	3	61.15	20.38	3.21*	0.02
Within Sample	277	1758.90	6.35		

*Significant at the $p < .05$

Data obtained from the summary of interior designer's metric comprehension related to use of imported merchandise are presented in Table L, Appendix H. It can be noted that the highest metric comprehension score is received by the group of interior designers that use 75 to 100 percent imported merchandise with a mean of 6.33.

The direction of the significant difference between comprehension of the metric system and use of imported merchandise is not identified (see Table XXXIII). The Duncan's Multiple Range takes into consideration the sample size. Therefore, the small number of respondents (3) who use 75 to 100 percent imported merchandise cause the difference to be nonsignificant.

TABLE XXXIII

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND USE OF IMPORTED MERCHANDISE

Percent of Use of Imported Merchandise	Mean	Number	Grouping	Significant Difference
75 to 100	6.33	3	A	
0 to 24	6.09	166	A	
25 to 49	5.38	95	A	
50 to 74	4.47	17	A	

df 277
Mean square 6.35
$p < .05$

Mean Range: 10=high score
0=low score

Type of Practice. The results of the analysis of variance of the difference between comprehension of the metric system and type of practice of the interior designer are given in Table XXXIV. A significant difference is identified between metric comprehension and type of practice. An F score value of 3.24 with an associated probability of .02 is identified.

Data obtained from the summary of interior designer's metric comprehension related to type of practice are presented in Table XLIX, Appendix H. It can be noted that interior designers who limit their practice to commercial design receive the highest metric comprehension score with a mean of 6.40, while those who are full-time educators received the lowest metric comprehension score with a mean of 4.00.

TABLE XXXIV

ANALYSIS OF VARIANCE BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND TYPE OF PRACTICE

Source of Variation	df	Sum of Squares	Mean Square	F	p
Between Practice	3	62.42	20.81	3.24*	0.02
Within Sample	271	1738.13	6.41		

*Significant at the $p < .05$

The direction of the significant difference between comprehension of the metric system and type of practice is obtained through the use of the Duncan's Multiple Range test. Significant differences are identified by means not grouped by the same letter (see Table XXXV).

Table XXXV indicates that the significant difference calculated by the F test between comprehension of the metric system and type of practice is found between designers in commercial practice and both designers in residential and educational capacities. Interior designers in commercial practice have a significantly higher metric comprehension score with a mean of 6.40 than those in residential practice with a mean of 5.38 and those working in an educational capacity with a mean of 4.00.

Significant differences are found among all of the professional variables of years of practice, use of imported merchandise, and type of practice. Therefore, the hypothesis that there is no significant difference in comprehension of the metric system by interior designers

and selected professional variables (years of practice, use of imported merchandise, and type of practice) is not accepted.

TABLE XXXV

DUNCAN'S MULTIPLE RANGE ANALYSIS BETWEEN COMPREHENSION OF THE METRIC SYSTEM AND TYPE OF PRACTICE

Type of Practice	Mean	Number	Grouping		Significant Differences	
Commercial	6.40	55	A		*	*
Commercial and Residential	5.79	125	A	B		
Residential	5.38	86		B	*	
Educational	4.00	9		B		*

df 271
Mean square 6.41
$p < .05$

Mean Range: 10=high score
0=low score

Summary

Two hundred and eighty-two professional interior designers in the American Society of Interior Designers have responded to the questionnaire. Approximately one-half of the respondents are males and one-half are females. The majority of the interior designers are between 30 and 60 years of age, have been in residential or a combination of residential and commercial practice for 10 to 20 years and have bachelors degrees.

Only 14 percent of the respondents use metric measurements in their practice. These designers use the metric system less than 24 percent of the time. One-half of the interior designers do not anticipate change to the metric system. The other one-half of the respondents anticipated change to the metric system to take place between 1978 and 1980 or beyond 1980. The main effect of change to the metric system expected is that it will take time to get use to. Eighty-three percent of the interior designers responding in this study feel that they are not prepared for the change.

The respondents suggest that training and education are the best tools for implementation in the form of self-instruction and design workshops. Those who were identified as benefiting the most are draftsmen and designers.

Of the 10 areas of emphasis in metric education identified the following five areas are not affected by any of the selected geographic, personal, or professional variables: metric abbreviation, decimal arithmetic, history of the metric system, volume measurement, and temperature. The remaining five areas are affected by the variables as follows:

1. Scale drawing is designated by the respondents as the first priority area to be included in metric education. However, designers using almost all imported merchandise are significantly less favorable to including scale drawing in metric education than all other designers.
2. Length measurement is designated by the respondents as the second priority to be included in metric education. However, males are significantly less favorable to the inclusion of

length measurement than females; designers in the profession the longest are significantly less favorable to the inclusion of length measurement than designers who are new to the profession; and designers using almost all imported merchandise are significantly less favorable to the inclusion of length measurement than all other designers.

3. Illumination is designated by the respondents as the third priority area to be included in metric education. However, residential designers feel that the area of illumination as a part of metric education is significantly less important than designers in other areas of practice. Also interior designers over 30 years of age consider the area of illumination significantly less important than younger designers.
4. Conversion technique is designated by the respondents as the fourth priority area to be included in metric education. The younger interior designers are significantly more favorable to including conversion techniques in metric education than all the other designers.
5. Weight measurement is one of the three areas rated as "undecided" as to whether or not it should be included in metric education. Females are significantly more favorable to the inclusion of weight measurement than males; designers under 45 are significantly more favorable to the inclusion of weight measurement than designers over 45; and designers new to the profession are significantly more favorable to the inclusion of weight measurement than designers who have been in the profession the longest.

This chapter has presented the statistical analysis of the data collected for the study. Frequency counts and percentages are reported to establish values for each of the variables with which the study is designed. Each objective of the study is discussed and the results are explained in detail.

The analysis tests the difference between mean scores among groups of interior designers. Scores are obtained for attitudes toward areas of emphasis in metric education and comprehension of the metric system. Further analysis provides the direction of the significant differences.

The study will be summarized in Chapter V. Conclusions will be stated and recommendations will be derived.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The preceding chapters described the nature of the study, a description of the sample, method of analysis and rationale for accepting or not accepting the hypotheses. This chapter presents an overview of the study, a summary of each of the hypotheses, conclusions, and recommendations.

In 1978, conversion to the metric system is at last on the horizon. It is expected that by 1980 the United States will be using metric measurements predominantly. In order to promote change to the metric system of measurement, metric instruction that meets the needs of individuals, and industry must be developed. The purpose of this study is to determine base-line information needed to tailor metric instruction programs for practitioners in the interior design industry.

A questionnaire has been developed which focused on studying attitudes toward areas of emphasis in metric education and comprehension of the metric system. The questionnaire has been mailed to 625 professional interior designers in the American Society of Interior Designers. Each respondent was asked to complete the questionnaire and return it by mail. Data has been obtained from 282 questionnaires, transposed, and analyzed by an IBM computer.

Summary of Findings

Findings obtained from the study that are related to the objectives are summarized as follows:

Objective one is to identify to what extent metric units are currently being used in the interior design industry. Metric units and standards are currently being used by 14 percent of the professional interior designers who responded to the questionnaire. Of those who are using the metric system, 96.8 percent use the metric system zero to 24 percent in their interior design business.

Objective two is to assess attitudes among interior designers toward change to the metric system. Attitude toward change to the metric system is divided between 55 percent who anticipate the change to the metric system and 45 percent who do not anticipate the change to the metric system. Change to the metric system is expected to take place between 1978 and 1980 or beyond 1980. Eighty-three percent of the interior designers are not prepared to change from their present measurement system to the metric system.

Objective three is to identify the preferred method for receiving metric education and which employees would benefit. The main effect of change to the metric system anticipated by interior designers is that the metric system "will take time to get use to." Interior designers who responded feel that the best way to implement the change to the metric system is through education and training. The preferred methods for receiving metric education are self-instruction or designer workshops. Employees who will benefit the most from the metric education are draftsmen, associate interior designers, assistant interior designers, and installers.

Conclusions

Six hypotheses for the study test certain geographic, personal, and professional variables that may be impacting upon attitudes toward areas of emphasis in metric education and comprehension of the metric system.

H_1: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers among regions designated by A.S.I.D. The geographic variable studied is regional location of the interior designer. Analysis of the data shows that there is no significant difference in attitude toward areas of emphasis in metric education by interior designers among the regions designated by A.S.I.D. Hypothesis one is therefore accepted.

H_2: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected personal variables (sex, age, and educational background). Analysis of the data shows that significant differences are attributed to sex of the interior designer between the attitude toward areas of length measurement and weight measurement as a part of metric education. In both instances females expressed a significantly more favorable attitude toward length measurement and weight measurement as a part of metric education.

Analysis of the data shows that significant differences are attributed to age of the interior designer between attitude toward conversion technique, weight measurement, and illumination as a part of metric education. Interior designers over 60 years of age and designers 45 to 60 years of age consider the area of weight measurement as a part of metric education significantly less important than designers 30 to

45 years of age and designers under 30 years of age. Interior designers under 30 years of age consider conversion technique as a part of metric education significantly more important than any of the other three age groups. Interior designers under 30 years of age consider the area of illumination as a part of metric education significantly more important than designers 45 to 60 years of age and designers 30 to 45 years of age.

Analysis of the data shows that no significant differences are attributed to educational background of interior designers. However, significant differences are found among the other personal variables of sex and age. Therefore, the second hypothesis is not accepted.

H_3: There is no significant difference in attitude toward areas of emphasis in metric education by interior designers and selected professional variables (years of practice, use of imported merchandise, and type of practice). Analysis of the data shows that significant differences are attributed to the number of years of practice in interior design between the attitude toward the areas of length measurement, weight measurement, and illumination as a part of metric education. Interior designers in practice over 20 years are significantly less favorable to having metric education concerned with length measurement than designers in practice 10 to 20 years and 5 to 10 years. Designers who have been in practice 5 to 10 years are significantly more favorable to metric education concerned with weight measurement than interior designers in practice 10 to 20 years and over 20 years. The significant difference calculated by the F test between attitude toward the area of illumination as a part of metric education and years of practice cannot be found by the Duncan's Multiple Range test.

Analysis of data shows that significant differences are attributed to use of imported merchandise between attitude toward scale drawing and length measurement as a part of metric education. Interior designers using 75 to 100 percent imported merchandise are significantly less favorable to having metric instruction concerned with scale drawing and length measurement as a part of metric education than any of the other three age groups.

Analysis of data shows that a significant difference in the area of illumination as a part of metric education is attributed to the type of practice of the interior designer. Interior designers in residential practice consider the area of illumination as a significantly less important part of metric education than any of the other three types of practice.

Significant differences are found among all of the professional variables of years in practice, use of imported merchandise, and type of practice. Therefore, the third hypothesis is not accepted.

H_4: There is no significant difference in comprehension of the metric system by interior designers among regions designated by A.S.I.D. The geographic variable studied is regional location of the interior designer. Analysis of the data shows that there is no significant difference in comprehension of the metric system by interior designers among regions designated by A.S.I.D. Hypothesis four is therefore accepted.

H_5: There is no significant difference in comprehension of the metric system by interior designers and selected personal variables (sex, age, and educational background). Analysis of the data shows that there is no significant difference in comprehension of the metric system by interior designers according to sex. The findings indicate that age

groups significantly effect comprehension of the metric system. Interior designers under 30 years of age had a significantly higher metric comprehension score than designers 45 to 60 years of age and over 60 years of age. Interior designers 30 to 45 years of age also had a significantly higher metric comprehension score than designers over 60 years of age. Analysis of data shows that there is no significant difference in comprehension of the metric system by interior designers according to educational background. Therefore, the fifth hypothesis is not accepted.

H_6: There is no significant difference in comprehension of the metric system by interior designers and selected professional variables (years in practice, use of imported merchandise, and type of practice). Analysis of the data shows that there is a significant difference in comprehension of the metric system by interior designers according to years of practice. The direction of the significant difference between comprehension of the metric system and years of practice calculated by the F test cannot be found with the Duncan's Multiple Range test.

Analysis of the data shows that there is a significant difference in comprehension of the metric system by interior designers according to use of imported merchandise. The direction of the significant difference between comprehension of the metric system and use of imported merchandise calculated by the F test cannot be found by the Duncan's Multiple Range test.

Analysis of the data shows that there is a significant difference in comprehension of the metric system by interior designers according to the type of practice. Interior designers in commercial practice

have a significantly higher metric comprehension than those in residential practice and those working in an educational capacity.

Significant differences are found among all of the professional variables of years of practice, use of imported merchandise, and type of practice. Therefore, the sixth hypothesis is not accepted.

Recommendations

Results of the study suggest the following recommendations in fulfilling of the fourth and last objective, to make recommendations as to means by which metric education can be best accomplished in the interior design profession.

1. A need for metric education can be found among the large number of interior designers who do not feel prepared to change to the metric system. Educational assistance should be provided.
2. Since training and education are designated as the best tools for implementation of the metric system among interior designers, curriculum should be developed to facilitate metrication among the interior design profession.
3. The preferred methods for receiving metric education are identified by professional interior designers as self-instruction and design workshops. Self-instruction materials should be developed to provide this particular type of curriculum. To provide workshops for designers, in-service education should be implemented.
4. In metric instruction, special emphasis should be placed on the particular needs of the draftsmen, designers (professional, associate, and assistant), and installers. Major emphasis

should be given to scale drawing, length measurement, and illumination.

5. Further research should be conducted in the following areas: (a) a comparison of attitudes toward the metric system among other design related professions such as draftsmen, decorators, and architects including landscape architects and (b) experimental research related to the success of self-instruction and in-service workshops in metric education among adults in the interior design profession.

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APPENDIX A

LETTER TO CHAPTER SECRETARIES

October 1, 1977

TO: Chapter Secretaries of A.S.I.D.

SUBJECT: A research survey is currently being done to gather information necessary to develop metric educational materials for the interior designer.

In order to select 50 members from each region, or a total of 500 professional members to receive the questionnaire, it is necessary for me to obtain a roster from each chapter. The names will be selected by random sample and given a number. No names will be used for the study.

I am a professional member of A.S.I.D., Chairman of the Board of Myers Haus Interiors, Inc., a faculty member at Central State University in Edmond, Oklahoma, and a doctoral candidate at Oklahoma State University.

Enclosed is a self-addressed stamped envelope to facilitate the mailing of the chapter names Your assistance will be greatly appreciated.

FROM: Cheryl Myers, A.S.I.D.
Home Economics Department
Central State University
Edmond, Oklahoma 73034

APPENDIX B

SUMMARY OF CHAPTER RESPONSES

TABLE XXXVI

SUMMARY OF CHAPTERS RESPONDING

Region	Total	Not Received	Received	Random Sample 10% Regional Total	Number Returned	Percent Returned
1	1,140	298	842	114	31	27
2	570	296	274	57	23	40
3	801	-	801	80	38	48
4	560	411	149	56	14	25
5	487	-	487	49	33	67
6	350	190	160	35	27	77
7	646	394	252	65	34	52
8	440	-	440	44	37	84
9	468	-	468	47	20	43
10	783	509	274	78	25	32
Total	6,245	2,098	4,147	625	282	45

APPENDIX C

TABLE OF SPECIFICATIONS

FOR THE INSTRUMENT

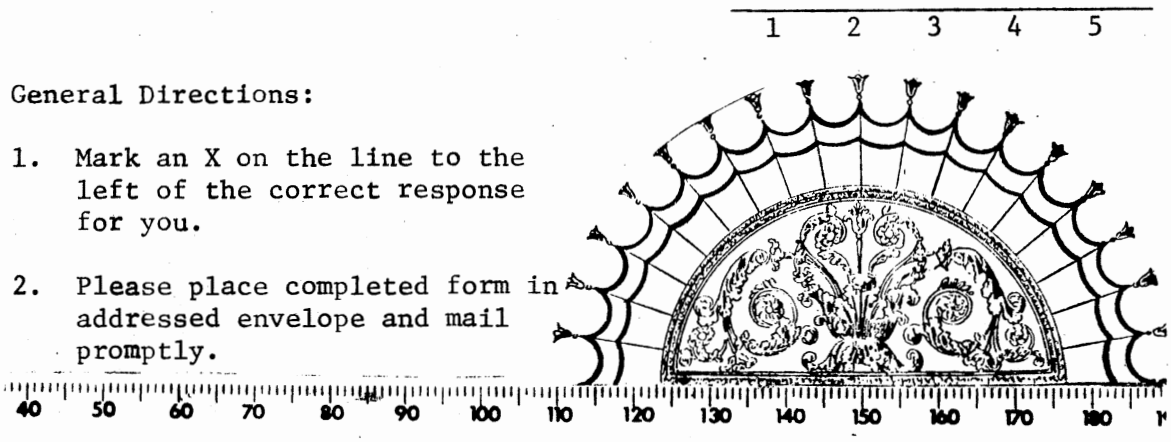
TABLE XXXVII

TABLE OF SPECIFICATIONS FOR THE INSTRUMENT

Objectives and Hypotheses of the Study	Test Item	Analysis
Obtain general information to be used as the independent variables	Open-ended questions 6, 7, 8, 9, 10, 11, 12 13, 14, 15	Frequency counts and percentages
Identify to what extent metric units are currently being used in the interior design industry	Multiple Choice 17, 18	Frequency counts and percentages
Access attitudes among interior designers change to the metric system in relation to the variables	Multiple Choice 19, 20-26, 27, 36, 44-47 Likert Scale 50-59	Frequency counts and percentages Analysis of Variance
Analyze the preferred method for receiving metric education and which employees would benefit in relation to the variables of the study	Multiple Choice 28-34, 37-43	Frequency counts and percentages
Determine a level of metric competency among respondents in relation to the variables of the study	Matching 62-71	Analysis of Variance

APPENDIX D

INSTRUMENT



General Directions:

1. Mark an X on the line to the left of the correct response for you.

2. Please place completed form in addressed envelope and mail promptly.

6. I am: ____(1) Females ____(2) Male

7. My age bracket is:

____(1) under 30 ____(3) 45 to 60

____(2) 30 to 45 ____(4) over 60

8. My years in the interior design practice:

____(1) under 5 years ____(3) 10 to 20 years

____(2) 5 to 10 years ____(4) over 20 years

9. To what extent is imported merchandise used in your design business:

____(1) 0-24% ____(3) 50-74%

____(2) 25-49% ____(4) 75-100%

My principal practice consists of:

____(10) commercial ____(12) residential/commercial

____(11) residential ____(13) educational

____(14) other (please specify)_____

15. The highest level of training received:

____(1) high school ____(5) have not received a diploma

____(2) bachelors ____(6) certificate

____(3) masters ____(7) other (please specify)

____(4) doctorate _____

(METRIC RULE)

For this study, the definition used to designate the metric system is:

A system of measurement where any two metric measurement notations within the same concept will differ only by a multiple of ten.

General Directions: Mark an X on the line to the left of the reply you select.

(METRIC RULE)

17. Are metric measurement units and metric engineering standards used in your interior design business?

____(1) Yes ____(2) No

18. To what extent is the metric system used in your design business?

____(1) 0-24% ____(2) 25-49% ____(3) 50-74% ____(4) 75-100%

19. If the metric system is not used, do you anticipate that your company will make changes toward metrication in metric measurement and engineering standards?

____(1) Yes ____(2) No

If you do anticipate change, please check how you think the change to the metric system would affect your company. (Check as many as appropriate).

____20. not at all

____21. would take time to get used to it

____22. dual dimensioning

____23. other (please specify)

____24. time for training of employees

____25. waste due to incorrect measurement

____26. don't know

---

27. When do you think you might begin to make changes in your present measurement system to the metric system on your own?

____(1) during 1977 ____(3) beyond 1980

____(2) between 1978 and 1980 ____(4) never

Which employees in your interior design business would benefit from a metric education course or experience?

____28. receptionist

____29. installers

____30. apprentice designers

____31. associate designers

____32. draftsmen

____33. secretary

____34. other (please specify)

_____

36. Do you feel adequately prepared to change from your present measurement system to the metric system?

____(1) yes ____(2) No

If you do not feel adequately prepared, please check which of the following methods you feel would prepare you professionally to use the metric system.

____37. self-instruction (books, tapes, casettes, etc.)

____38. correspondence course

____39. night class (short course)

____40. week-end workshop

____41. workshop for designers

____42. television course

____43. other (please specify)_____

What would your interior design company have to do to implement the change-over to the metric system?

____44. purchase equipment

____45. change operational practices

____46. provide education and training

____47. other (please specify)_____

Below is a list of specific areas that could be included as a part of metric instruction. Encircle one of the symbols preceding each of the following statements: SA stands for "Strongly Agree", A for "Agree", ? for "Uncertain", D for "Disagree", and SD for "Strongly Disagree".

SA A ? D SD 50. Metric abbreviations are important for the interior designer.

SA A ? D SD 51. A decimal arithmetic review is essential for the interior designer.

SA A ? D SD 52. Scale drawing is imperative for the interior designer.

SA A ? D SD 53. Conversion techniques are vital for the interior designer.

SA A ? D SD 54. The history of the metric system is necessary for interior designers.

SA A ? D SD 55. Length measurement is mandatory for the interior designer.

SA A ? D SD 56. Weight measurement is crucial for the interior designer.

SA A ? D SD 57. Volume measurement is necessary for the interior designer.

SA A ? D SD 58. An understanding of temperature is a requirement for designers.

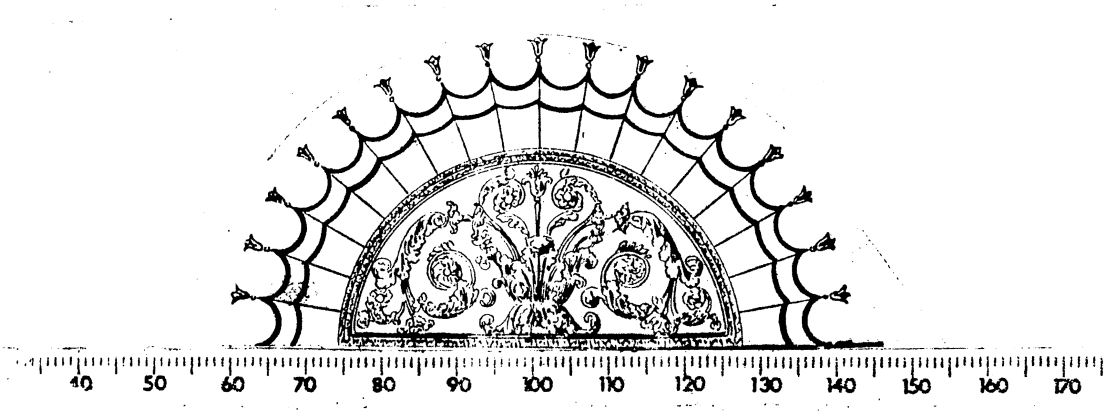
SA A ? D SD 59. Illumination planning is vital for the interior designer.

DESIGNING WITH METRICS

Match each of the following measurements with the most appropriate metric notation with which it corresponds. Write the number identifying the metric notation in the blank to the left of the measurement. A metric notation may be used more than once and it may not be necessary to use all notations.

Measurement	Metric Notation
____62. Length of draperies	1. millimeter
____63. Weight of furniture	2. centimeter
____64. Quantity of paint for painting a room	3. square centimeter
____65. Light level for reading area	4. square meter
____66. Useful storage space in a cabinet or storage area	5. cubic meter
____67. Temperature of a plant room	6. gram
____68. Width of upholstery fabric	7. kilogram
	8. liter
	9. milliliter

____69.	Amount of wallpaper for a room	10. lumens
____70.	Capacity of an aquarium tank	11. meter
____71.	Weight of a bag of decorative pebbles	12. Celsius

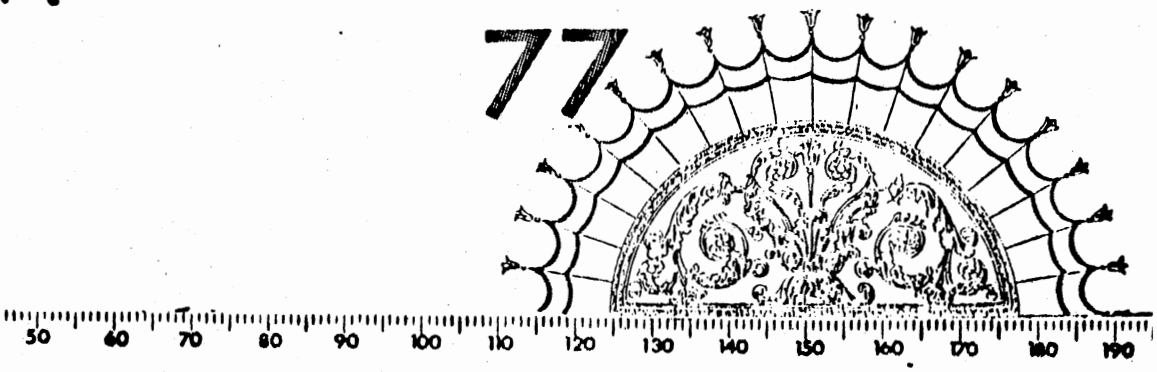


THANK YOU

APPENDIX E

COVER LETTER

HORIZONS 77



METRICS

Dear ASID Member,

The research being done by Cheryl Myers, ASID is a part of her doctoral dissertation.

Further, the shared information resulting from this research will be of value to the Society and the members as we approach the conversion to the metric system.

I hope you will take the time to complete the questionnaire and help all of us by your efforts.

Very truly yours,

H. Albert Phibbs, FASID
President
American Society of Interior Designers

(METRIC RULE)

"YOU ARE 1 OF 600"

professional ASID members who have been selected to receive the enclosed questionnaire. This information will become the data for a doctoral dissertation on the prevailing attitudes of professional interior designers toward the metric system.

Please respond to the enclosed questions, mail by November 20th, and look forward to hearing about the results.

Your assistance will be greatly appreciated!

Cheryl Myers, ASID

APPENDIX F

ORIGINAL METRIC COMPREHENSION QUESTIONS

For each of the following questions select the correct response from among the four listed. Write the letter of your choice in the blank to the left of the exercise.

(METRIC RULE)

____62. How many meters (m) of fabric should be ordered to upholster a sectional that requires 15.93 m for the sofa, 10.09 m for the love seat, and 2.52 m for the ottoman?

A. 25.84 m
B. 28.54 m
C. 25.73 m
D. 27.54 m

____63. If a bolt of material contains 30 meters and you use 23.03 m for a picture window drapery, how many meters are left?

A. 7.07 m
B. 6.97 m
C. 7.97 m
D. 70.7 m

____64. How many meters of carpet will be needed for a room that measures 3.95 meters wide and 5.15 meters long?

A. 18.67 m
B. 21.93 m
C. 157.2 m
D. 20.34 m

____65. A room requires 34.56 square meters (m^2) of wallpaper to cover all four walls. One single roll contains approximately 3 m^2. How many single rolls should be ordered for the room?

A. 8 single rolls
B. 10 single rolls
C. 12 single rolls
D. 14 single rolls

____66. A wall 240 centimeters (cm) high and 360 cm wide contains 86 400 cm^2. How many square meters of wallpaper will be needed?

A. 8.64 m^2
B. 86.4 m^2
C. 16.7 m^2
D. 1.67 m^2

____67. A drapery requires 3 widths of material each 175 cm long or a total of 525 cm. How many meters will be ordered?

A. 5.25 m
B. 5250 m
C. 52.5 m
D. 10.50 m

____68. If eight inches are allowed for a double hem, approximately how many cm would this be?

A. 10 cm
B. 16 cm
C. 20 cm
D. 24 cm

____69. A suggested conversation group should be no larger than ten feet. Approximately how many meters is this?

A. 2 m
B. 3 m
C. 5 m
D. 7 m

____70. What is the approximate metric notation for the amount of paint equivalent to 2 gallons?

A. 2.1 l
B. 7.69 l
C. 28.3 l
D. 30.7 l

____71. A sofa weighs 80 pounds. Approximately how many kilograms (kg) will the freight company charge you for delivery?

A. 40 kg
B. 120 kg
C. 160.8 kg
D. 36.36 kg

____72. What should be the approximate temperature in a plant room?

A. 10°C.
B. 20°C.
C. 30°C.
D. 40°C.

____73. In place of the 4" square ceramic tiles, what size from those listed below would one probably order?

A. 10 cm
B. 16 cm
C. 20 cm
D. 25 cm

____74. How many liters of wood stain would be equivalent to 500 milliliters?

A. 5 l
B. 10 l
C. .5 l
D. 50 l

____75. Which scale would probably be used when drafting a 1/4" scale residential project?

A. 2 cm = 1 m
B. 1 cm = 1 m
C. 5 ml = 1 m
D. 50 sm = 1m

APPENDIX G

FOLLOW-UP LETTER

I can only wish you a Merry Christmas, however, you can guarantee my a Happy Holiday by returning the questionnaire that was mailed to you as a professional member of A.S.I.D. The information will become the data for my doctoral dissertation on "The Prevailing Attitudes of Professional Interior Designers Toward the Metric System." Please return the information by December 10th. If your response is already in the mail, I am sure I will receive it in the next few days.

Thank you for your help and assistance,

Cheryl Myers, A.S.I.D.
Home Economics Department
Central State University
Edmond, Oklahoma 73034

APPENDIX H

SUMMARY OF DATA

TABLE XXXVIII

SUMMARY OF INTERIOR DESIGNER'S RESPONSES TO
THE ATTITUDE SCALE BY REGION OF A.S.I.D.

Rank	Region 1 N=31		Region 2 N=23		Region 3 N=38		Region 4 N=14		Region 5 N=33		Region 6 N=27		Region 7 N=34		Region 8 N=37		Region 9 N=20		Region 10 N=25	
	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean
1	52	1.18	55	1.35	52	1.18	52	1.29	52	1.21	52	1.19	52	1.29	52	1.14	52	1.35	52	1.20
2	55	1.45	52	1.41	59	1.37	59	1.36	55	1.27	59	1.46	55	1.35	55	1.27	55	1.55	59	1.42
3	59	1.50	59	1.73	55	1.43	55	1.50	59	1.36	55	1.50	55	1.38	59	1.54	53	1.79	55	1.48
4	53	2.00	53	1.77	53	1.87	51	2.23	53	1.76	53	1.96	53	1.65	53	1.65	59	1.84	53	1.96
5	58	2.48	50	2.09	50	2.32	53	2.36	51	2.00	50	2.12	51	2.03	50	2.28	50	2.00	56	2.29
6	51	2.56	58	2.46	51	2.32	50	2.64	50	2.09	51	2.58	50	2.12	51	2.41	51	2.05	51	2.38
7	50	2.64	57	2.59	56	2.47	57	2.93	58	2.42	57	2.62	58	2.24	58	2.43	58	2.58	58	2.38
8	57	2.85	51	2.64	58	2.47	56	3.14	56	2.52	56	2.65	56	2.36	57	2.68	57	2.68	57	2.48
9	56	3.11	56	2.65	57	2.50	58	3.14	57	2.73	58	2.77	57	2.58	56	2.75	56	2.75	50	2.63
10	54	3.48	54	3.09	54	3.51	54	3.57	54	3.06	54	3.15	54	3.00	54	3.24	54	3.00	54	3.35

Q = question
1 = high attitude score
5 = low attitude score

TABLE XXXIX

SUMMARY OF INTERIOR DESIGNER'S RESPONSES
TO THE ATTITUDE SCALE BY SEX

Rank	Female N=129 Q	Female N=129 Mean	Male N=148 Q	Male N=148 Mean	Total N=267* Q	Total N=267* Mean
1	52	1.18	52	1.29	52	1.24
2	55	1.31	55	1.47	55	1.39
3	59	1.43	59	1.52	59	1.48
4	53	1.84	53	1.83	53	1.84
5	50	2.24	51	2.26	50	2.27
6	51	2.38	50	2.28	51	2.31
7	58	2.44	58	2.55	58	2.50
8	56	2.47	57	2.74	56	2.64
9	57	2.53	56	2.78	57	2.64
10	54	3.24	54	3.22	54	3.23

Q = question
1 = high attitude score
5 = low attitude score

*5 respondents did not identify sex

TABLE XL

SUMMARY OF INTERIOR DESIGNER'S RESPONSES
TO THE ATTITUDE SCALE BY AGE GROUPS

Rank	Under 30 N=23 Q	Under 30 N=23 Mean	30 to 45 N=117 Q	30 to 45 N=117 Mean	45 to 60 N=109 Q	45 to 60 N=109 Mean	Over 60 N=32 Q	Over 60 N=32 Mean	Overall Mean N=281* Q	Overall Mean N=281* Mean
1	52	1.04	52	1.23	52	1.27	52	1.24	52	1.23
2	59	1.09	55	1.39	55	1.46	59	1.39	55	1.40
3	55	1.13	59	1.59	59	1.46	55	1.48	59	1.48
4	53	1.30	53	1.84	53	1.86	53	2.21	53	1.84
5	50	1.91	50	2.19	51	2.33	50	2.31	50	2.28
6	58	2.00	51	2.32	50	2.45	51	2.38	51	2.32
7	56	2.04	56	2.46	58	2.63	58	2.46	58	2.49
8	51	5.13	58	2.47	57	2.78	57	2.50	56	2.64
9	57	2.74	57	2.55	56	2.85	56	3.07	57	2.65
10	54	3.13	54	3.19	54	3.22	54	3.57	54	3.24

Q = question
1 = high attitude score
5 = low attitude score

*1 respondent did not identify age

TABLE XLI

SUMMARY OF INTERIOR DESIGNER'S RESPONSES TO THE ATTITUDE SCALE BY EDUCATIONAL BACKGROUND

Rank	High School N=18		Bachelors N=185		Masters N=29		Doctorate N=1		No Diploma N=6		Certificate N=23		Other N=14	
	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean	Q	Mean
1	52	1.44	52	1.19	52	1.21	52	1.00	59	1.50	52	1.30	52	1.33
2	55	1.16	55	1.35	55	1.38	52	1.00	52	1.60	59	1.52	55	1.46
3	59	1.72	59	1.45	59	1.45	53	1.00	55	1.60	55	1.65	59	1.62
4	53	2.17	53	1.77	53	1.76	55	1.00	50	2.00	53	2.22	53	1.77
5	51	2.28	50	2.28	50	2.18	59	1.00	53	2.00	50	2.35	51	2.08
6	50	2.39	51	2.35	57	2.32	50	2.00	57	2.00	51	2.35	50	2.39
7	54	2.89	58	2.44	51	2.36	54	2.00	51	2.25	58	2.64	58	2.50
8	56	3.06	56	2.59	58	2.36	56	2.00	58	2.25	57	2.77	56	2.62
9	58	3.06	57	2.65	56	2.43	57	2.00	56	2.50	56	3.09	57	2.83
10	57	3.11	54	3.29	54	3.26	58	2.00	54	3.25	54	3.44	54	2.83

Q = question
1 = high attitude score
5 = low attitude score

TABLE XLII

SUMMARY OF INTERIOR DESIGNER'S RESPONSES TO THE ATTITUDE SCALE BY YEARS OF PRACTICE

Rank	Under 5 years N=7		5-10 years N=56		10-20 years N=107		Over 20 years N=110	
	Q	Mean	Q	Mean	Q	Mean	Q	Mean
1	52	1.14	52	1.14	52	1.22	52	1.31
2	53	1.29	55	1.20	55	1.34	59	1.52
3	55	1.43	59	1.27	59	1.53	55	1.58
4	59	1.57	53	1.58	53	1.90	53	1.97
5	50	1.86	50	1.96	50	2.35	51	2.27
6	51	2.43	56	2.11	51	2.46	50	2.42
7	56	2.43	51	2.14	58	2.60	58	2.53
8	58	2.57	58	2.21	57	2.69	57	2.71
9	57	3.00	57	2.45	56	2.70	56	2.86
10	54	3.29	54	3.11	54	3.29	54	3.26

Q = question
1 = high attitude score
5 = low attitude score

TABLE XLIII

SUMMARY OF INTERIOR DESIGNER'S RESPONSES TO THE ATTITUDE SCALE BY USE OF IMPORTED MERCHANDISE

Rank	0 to 24% N=166 Q	Mean	25 to 49% N=95 Q	Mean	50 to 74% N=17 Q	Mean	75 to 100% N=3 Q	Mean
1	52	1.21	52	1.25	52	1.13	51	2.33
2	55	1.36	55	1.48	55	1.19	52	2.33
3	59	1.46	59	1.51	59	1.33	53	2.33
4	53	1.79	53	1.82	58	2.20	55	2.33
5	50	2.28	50	2.19	51	2.31	57	2.33
6	51	2.32	51	2.30	53	2.40	59	2.33
7	58	2.48	58	2.55	57	2.53	50	2.67
8	56	2.54	57	2.69	50	2.73	54	3.00
9	57	2.64	56	2.73	56	3.00	56	3.00
10	54	3.26	54	3.23	54	3.19	58	3.00

Q = question
1 = high attitude score
5 = low attitude score

TABLE XLIV

SUMMARY OF INTERIOR DESIGNER'S RESPONSES TO THE ATTITUDE SCALE BY TYPE OF PRACTICE

Rank	Commercial N=55		Residential N=125		Comm/Res. N=86		Educational N=9	
	Q	Mean	Q	Mean	Q	Mean	Q	Mean
1	52	1.09	52	1.33	52	1.24	52	1.11
2	55	1.28	55	1.52	55	1.35	59	1.33
3	59	1.41	59	1.64	59	1.40	55	1.56
4	53	1.67	53	1.73	53	1.95	58	2.00
5	50	2.06	51	2.34	50	2.27	51	2.11
6	51	2.24	50	2.41	51	2.36	53	2.11
7	56	2.39	58	2.61	58	2.48	50	2.33
8	58	2.46	57	2.78	57	2.57	57	2.56
9	57	2.62	56	2.83	56	2.62	56	2.78
10	54	3.26	54	3.29	54	3.20	54	3.22

Q = question
1 = high attitude scale
5 = low attitude scale

TABLE XLV

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION BY REGION OF A.S.I.D.

Rank	Region	Number	Score
1	West Central	33	6.46
2	North Pacific	20	6.40
3	Northeast	31	6.07
4	Rocky Mountain	37	6.03
5	Southeast	38	5.97
6	Southwest	34	5.50
7	South Pacific	25	5.48
8	Mid-Atlantic	23	5.39
9	Midwest	27	4.93
10	East Central	14	4.50

$\bar{X} = 5.76$
Score Range: High 10 - Low 0

TABLE XLVI

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION BY SEX

Rank	Sex	Number	Score
1	Male	148	5.82
2	Female	129	5.71

Score Range: High 10 - Low 0

TABLE XLVII

SUMMARY OF INTERIOR DESIGNER'S
METRIC COMPREHENSION BY AGE

Rank	Age	Number	Score
1	Under 30	23	6.91
2	30 to 45 years	117	5.89
3	45 to 60 years	109	5.63
4	Over 60	32	4.75

Score Range: High 10 - Low 0

TABLE XLVIII

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION
BY EDUCATIONAL BACKGROUND

Rank	Educational Background	Number	Score
1	Doctorate	1	7.00
2	Masters	29	6.48
3	Other	14	6.07
4	High School	18	5.78
5	Bachelors	185	5.69
6	Certificate	23	5.61
7	Not Received a Diploma	6	3.83

Score Range: High 10 - Low 0

TABLE XLIX

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION BY YEARS OF PRACTICE

Rank	Years of Practice	Number	Score
1	Under 5	7	7.00
2	5 to 10 Years	56	6.46
3	10 to 20 Years	107	5.79
4	Over 20 Years	110	5.24

Score Range: High 10 - Low 0

TABLE L

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION BY USE OF IMPORTED MERCHANDISE

Rank	Use of Imported Merchandise	Number	Score
1	75% to 100%	3	6.33
2	0 to 24%	166	6.09
3	25% to 49%	95	5.38
4	50% to 74%	17	4.47

Score Range: High 10 - Low 0

TABLE LI

SUMMARY OF INTERIOR DESIGNER'S METRIC COMPREHENSION BY TYPE OF PRACTICE

Rank	Type of Practice	Number	Score
1	Commercial	55	6.40
2	Residential	125	5.79
3	Residential & Commercial	86	5.38
4	Educational	9	4.00

Score Range: High 10 - Low 0

VITA 2

Cheryl Reece Myers

Candidate for the Degree of

Doctor of Education

Thesis: COMPREHENSION OF THE METRIC SYSTEM AND ATTITUDES TOWARD METRICATION AMONG PROFESSIONAL INTERIOR DESIGNERS IN THE AMERICAN SOCIETY OF INTERIOR DESIGNERS

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