McCutcheon, Linda Flowers

INFLUENCES OF ENERGY CONSERVATION EDUCATION ON ATTITUDES AND BEHAVIORS OF SELECTED YOUTHS IN PIEDMONT NORTH CAROLINA

The University of North Carolina at Greensboro PH.D. 1981

University Microfilms International 300 N. Zeeb Road, Ann Arbor, MI 48106

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark __✓__.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages ✓
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _____ lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Other _____

INFLUENCES OF ENERGY CONSERVATION EDUCATION ON ATTITUDES AND BEHAVIORS OF SELECTED YOUTHS IN PIEDMONT NORTH CAROLINA

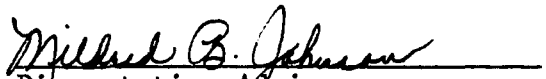
by

Linda Flowers McCutcheon

A Dissertation submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
1981

Approved by



Dissertation Adviser

McCUTCHEON, LINDA FLOWERS. Influences of Energy Conservation Education on Attitudes and Behaviors of Selected Youths in Piedmont North Carolina. (1981) Directed by: Dr. Mildred B. Johnson. Pp. 146.

The purpose of this experimental study was to examine the attitudes and behaviors of selected youths in Piedmont North Carolina toward energy conservation. The specific objectives were to determine attitudes and behaviors of selected youths toward energy conservation, to determine the influence of energy education on the attitudes and behaviors of selected youths, and to determine if there was a relationship between four variables--age, sex, geographic location, and prior energy conservation experiences--as related to energy conservation attitudes and behaviors.

The sample consisted of 284 youths (127 from control groups, and 157 from experimental groups). These youths were seven to nineteen years of age, who were members of a 4-H Club affiliated with the North Carolina Agricultural Extension Service, and who resided in fourteen counties located in Piedmont North Carolina. Each youth participating in the study completed a pretest and posttest which solicited information concerning attitudes and behaviors toward energy conservation. Both groups completed the pretest in October or November, 1980, and posttests in January, 1981. The experimental groups received energy education instruction in the form of a "4-H Energy Fun Day" after completing the pretest, while the control groups received no energy-related instruction.

The demographic data obtained in this study indicated that over two-thirds of the youths were ages ten through thirteen. Sixty percent were female, and the remaining 40 percent were male. Approximately two-thirds of the youths resided in the county, and the remaining one-third were urban residents. Data revealed that approximately 60 percent of the youths had taken energy conservation classes in school, and approximately 40 percent had participated in a 4-H energy class or an energy-related assignment or project.

The analysis of data involved both descriptive statistics and tests of hypotheses. Data obtained from the North Carolina Youth Energy Survey exhibited a limited range, a five-point continuum for attitudes, and a two-point range for behaviors. Over one-half of the responses from the pretests were within the first two points of the attitude continuum denoting favorable attitudes and less than 25 percent of the responses denoted favorable behaviors at the onset of the study.

The hypotheses were tested utilizing *t*-tests, correlation techniques, and two-way analysis of variance. A significant relationship was noted for seven of the ten hypotheses.

For the majority of attitudinal and behavioral scales and subscales, no significant differences were found between selected youths who have and have not been involved in an energy conservation educational program. When differences occurred, the control groups indicated more favorable attitudinal changes, while the experimental groups indicated more favorable behavioral changes.

The age of the youths was not significant for attitudes, but was significant between age and behaviors. An upward movement of energy-consciousness was revealed that was directly related to age. The older the youths, the more energy conservation behaviors were reported. Negligible differences for energy-conscious attitudes and behaviors were indicated between sexes.

Geographic location was not a factor when examining attitudes. Conversely, there was a significant relationship between geographic location and behaviors. The youths who lived in towns and cities greater than 10,000 showed the most favorable behavior changes, while county residents showed a moderate amount of behavior change.

When considering the three categories of prior energy instruction, it was revealed that in a majority of instances the attitudinal change was more favorable for those youths who had no prior energy conservation experiences. The analysis for behavioral changes indicated significant differences. It appeared that youths who were involved in two or more courses reported more energy-conscious behaviors, while those youths having one contact with energy education indicated less favorable behavior changes.

Energy-conscious changes were exhibited in both the control and experimental groups, but in a different manner. These findings could be of value to educators, curriculum developers, program evaluators, and others who are working or doing research in the field of energy.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

Dissertation Adviser Mildred Johnson

Committee Members William A Brewer

Barbara Clawson

Letty S. Pryor

March 23, 1981
Date of Acceptance by Committee

March 19, 1981
Date of Final Oral Examination

ACKNOWLEDGEMENTS

Sincere appreciation is expressed to Dr. Mildred B. Johnson, adviser and friend, for her support, encouragement, and guidance throughout this study. Appreciation is also extended to committee members: Dr. William Powers, Dr. Barbara Clawson, and Dr. Letty Pryor.

Gratitude is expressed to Dr. T. Carlton Blalock, Director, North Carolina Agricultural Extension Service; Dr. Donald Stormer, State Leader, 4-H; Dr. Dalton Proctor, Assistant State Leader, 4-H; and 4-H agents and youth participants in Anson, Davie, Durham, Forsyth, Guilford, Iredell, Lee, Lincoln, Montgomery, Moore, Randolph, Rowan, Stokes, Surry, and Wake Counties for the cooperation and assistance with this study. Special recognition is given to Miss Charlotte Womble, Specialist in Charge, for her support and encouragement.

The author is indebted to Dr. Glenda M. Herman for her assistance, expertise, and friendship throughout the design and implementation of this study.

A very special acknowledgment is given to the author's husband, W. Kenneth McCutcheon, for his assistance, support, encouragement, and patience. In addition, gratitude is expressed to the author's parents, Mr. and Mrs. Woodrow W. Flowers, and Grandmother, Mrs. Berta P. Flowers, for their special kind of support and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

Page

TABLE

Page

TABLE

CHAPTER I

INTRODUCTION

Three presidents of the United States, leaders of both political parties, business people, and academicians insist that America's energy problems are real and that conservation is one obvious solution (Van Meter, 1979). The United States has entered an era of profound alteration of its traditional patterns and concepts in the areas of energy consumption. Sources of supply, rates of use, and price relationships, as well as national security, have been areas affected with uncertainty and conflict. The first priority is to manage energy problems in ways that will not impede long-term solutions, and will give due recognition to the necessity of reconciling other aspirations of society with provision of abundant energy (Landsberg, 1974). However, it is a well publicized fact that the United States population, which represents only 6 percent of the world population, is still consuming 33 percent of the world's supply of energy (McKown, 1980).

Americans must develop a standard of living which is less dependent on energy consumption. Much of the citizenry would like to believe that tomorrow is far from them and foolishly ignores warnings that new patterns of energy consumption are needed (Odum, 1978). Gray (1978) concluded that the refusal to change beliefs, attitudes, and behaviors in energy conservation was "the grief dimension of slowing growth," as it affected a society that had a foundation built

on the "American Dream." The citizenry has lived with two firmly implanted myths: that resources are unlimited and that America is a land of plenty. Thus, how does a nation built on the beliefs of endless freedom and opportunity cope with a dwindling and costly energy supply?

The American citizenry began to realize the United States energy problem with the onset of the international oil crisis of 1973-1974 that produced long gas lines and rationing of gasoline. The oil embargo did not cause the energy crisis, but brought to the attention of the American public the fact that there was indeed an energy problem that must be dealt with effectively. The high demand for and cost of energy as well as the fact that America's energy supply came from now dwindling fossil fuels such as petroleum, coal, and natural gas only compounded the problem (Clinard and Colline, 1977).

The impact of the reality of an energy problem was defined by Kash et al. (1976) as resulting from two developments: first, a growing gap between domestic energy production and consumption; and secondly, an increased demand for broader participation in decision making and policy making in the United States.

Butler (1979) attributed the energy problem to the fact that for decades fossil fuels were like air and water--too economical for the consumer to be concerned. Thus, when the supply situation began to change, the price did not change immediately with it. The economic value as related to the increased scarcity was not clear to the consumer. However, as the abnormal imbalance of price and value drastically righted, the consumer reaction toward this reality was one of skepticism.

In the winter of 1977 the nation faced one of the worst winters in over a hundred years. Coomer (1977) cited this crisis as being a factor that caused people to operate within nature's parameters by utilizing energy sources effectively. It was reiterated that wasteful consumption must be discontinued and the American people must be educated to the validity of the rapid depletion of the earth's nonrenewable resources. Coomer (1977:228) summarized:

> Conspicuous consumption is deeply ingrained in the American way of life: People gain status by buying a new automobile or going on an expensive safari in Africa and lose it by making the old car last another year or spending their vacation at home.

Research on energy used in the home conducted by Paolucci and Hogan as early as 1973, found that the use of energy in terms of material inputs for the family had diminished the human energy expended by most American families. Families' use of convenience foods, wash-and-wear fabrics, automatic washers and dryers, power lawn mowers, and automobiles had become accepted. Paolucci and Hogan (1973:13) stated. . .

> while electric guitars, stereos, carving knives, barbeque pits, toothbrushes, and a whole litany of "plug-ins" may not appreciably decrease human energy, they are part of the daily choice pattern of high-energy-use society.

How can the individual or family adopt energy-conscious behaviors? One answer that many researchers continued to support was that of changing personal habits, lifestyles, and standards of living (Abelson, 1974; Hayes, 1977; and McKown, 1980). McKown (1980) cited the most effective way of conserving energy as changing energy-intensive lifestyles. It was stated that consumers may be willing to make

adjustments in areas like housing design, yet less willing to change overall living patterns.

Lifestyles, standards of living, and basic values must be evaluated if energy consciousness is to work effectively. Hayes (1977:215) summarized:

> For twenty years, the world has pursued a deadend path. This energy route cannot be changed without fundamentally altering society. Some alternatives are better than others because the changes they dictate are relatively attractive, but there is no way of avoiding some form of pervasive change. If, for example, the world were to opt for harmonious, small-scale, decentralized, renewable energy technologies, few aspects of modern life would go unaffected.

Abelson (1974) viewed the United States as facing an extensive adjustment to living circumstances in which energy costs were high and the supply limited. It was stated that the adjustment was subject to the manner in which government, academia, and the general public coped with situations that were defined as being critical in shaping the future of society. According to Abelson, people of Western Europe and Japan live fairly comfortable lives while utilizing an energy per capita of less than half that of the United States. Abelson (1974:v) asked the general public to explore the question: "Is there really a great loss in quality of life when one drives a one-ton rather than a two-ton automobile?"

The impact of changes in the pattern of energy use and availability of sources of energy were discussed by Bisbee (1974). It was stated that all aspects of the American way of life and standard of living needed to be changed drastically. For the next decade, Bisbee prescribed that a concerted effort to change patterns of energy

consumption be made by three aspects of society: individuals, industry, and government. It was recommended that individuals select an energy-conserving style of living and consciously conserve energy when possible. On the part of industry, the recommendation was for the development of more efficient technology for electrical production and the deletion of practices which were careless, unnecessary and wasteful. In addition, the careful use of energy and a realistic balance between consumption and personal benefits were recommended. It was suggested that the government establish clearer national policies and guidelines on energy.

According to Ward (1980), "There is no more abundant, cleaner, cheaper, or misunderstood source of energy than conservation." The problem was viewed as one of semantics; Ward stated that too many people confuse conservation with sacrifice, austerity, and deprivation rather than elimination of a great deal of waste. Ward contradicted Bisbee (1974) and other researchers by concluding that the general public may enjoy the same or even higher standard of living and still conserve energy. The 1973 oil embargo was cited as an example. Government statistics revealed industry's use of energy had declined by 6 percent and productivity increased by 12 percent; the energy efficiency of today's homes had increased approximately 10 percent; and the efficiency of home appliances had increased by 5 percent.

The "energy ethic" was discussed by Carroll, Lewis, and Berger (1978) as being the interaction among three complex elements of our society. The authors portrayed the ethic as a delicate balance

between the energy system, the environment, and the economy. It was further cited that any permanent change in the direction of the energy demand and supply for the future would involve the formation of a new "energy ethic."

Researchers have agreed that the long-term solution to the energy crisis will be the development of alternative energy sources. However, it is believed that these alternatives will not be available for wide-scale use for another twenty to twenty-five years. Therefore, conservation has been suggested as a time-buying strategy. It appears evident that for the current generation, conservation must become a way of life (Clinard and Colline, 1977). Research has indicated that individuals are slow to accept change. It has been noted that it may take two or more generations for social changes to be implemented. Thus, youths in the formative stages of development may be the most viable group to benefit from energy education programs.

Importance of the Study

Since the oil embargo of 1973, energy has become a household word. Energy conservation means possible changes in lifestyles and adjustments to alternative energy sources. Therefore, the American people should be seeking information to broaden knowledge and understanding of the energy decisions. A summary of findings from social-science studies stated that the American public has adopted only minimal conservation practices (Olsen and Goodnight, 1977).

To develop and implement an energy conservation ethic rather than short-sighted energy programs and policies, attitudes and behaviors must be ascertained as well as learning strategies evaluated. In seeking to develop programs to change lifestyles, many researchers have concurred that youths as well as adults have more meaningful learning experiences when these experiences are direct and purposeful. Also, attitudinal and behavioral changes occur more readily when individuals have had prior personal experiences in wise decision making and not merely the presentation of knowledge or facts (Hammerman and Hammerman, 1968; Leedom, 1978; Shomon, 1964; Swan and Stapp, 1974; and Vivian, 1973).

Many North Carolina officials have voiced a need for viable energy education programs for the state. One of the officials, the Director of the North Carolina Agricultural Extension Service, indicated a willingness to support and promote energy education programs. Since it was concluded that youths constituted a viable audience, the services of Extension personnel working with youth groups were offered as a means of facilitating this research. A concerted effort should be made toward implementing effective energy conservation programs in order to help individuals and families examine and change their values and behaviors.

Purpose of the Study

The purpose of this study was to examine the attitudes and behaviors of selected youths in Piedmont North Carolina toward energy conservation. The four specific objectives outlined for this study

were: (1) to determine attitudes and behaviors of selected youths toward energy conservation; (2) to determine the influence of energy education on the attitudes of selected youths; (3) to determine the influence of energy education on the behaviors of selected youths; and (4) to determine whether or not four variables--age, sex, geographic location, and prior energy conservation experiences--were related to energy conservation attitudes and behaviors. An analysis of the findings of the study could be of value to educators involved in the planning, implementing, and evaluating of energy education programs.

Hypotheses

The following hypotheses were presented for this study:

Hypothesis One: There is no significant difference in energy conservation attitudes between selected youths who have and have not been involved in an energy conservation education program.

Hypothesis Two: There is no significant difference in energy conservation behaviors between selected youths who have and have not been involved in an energy conservation educational program.

Hypothesis Three: There is no significant relationship between energy conservation attitudes and age of selected youths.

Hypothesis Four: There is no significant relationship between energy conservation behaviors and age of selected youths.

Hypothesis Five: There is no significant relationship between energy conservation attitudes and sex of selected youths.

Hypothesis Six: There is no significant relationship between energy conservation behaviors and sex of selected youths.

Hypothesis Seven: There is no significant relationship between energy conservation attitudes and geographic location of selected youths.

Hypothesis Eight: There is no significant relationship between energy conservation behaviors and geographic location of selected youths.

Hypothesis Nine: There is no significant relationship between energy conservation attitudes and prior energy conservation experiences of selected youths.

Hypothesis Ten: There is no significant relationship between energy conservation behaviors and prior energy conservation experiences of selected youths.

Limitations of the Study

The study was limited to youths seven to nineteen years of age who were members of a 4-H club affiliated with the North Carolina Agricultural Extension Service in Piedmont North Carolina as of September 1, 1980.

Definition of Terms

Terms used in relation to this study were as follows:

Energy Conservation Ethic - The balance between people and resources created through a lifestyle.

4-H Youths - members of a voluntary informal educational program for young people from ages seven to nineteen.

Piedmont North Carolina - (as defined by the Department of Administration, State of North Carolina) 29 counties located in the central part of North Carolina; namely, Surry, Stokes, Rockingham, Caswell, Yadkin, Forsyth, Guilford, Alamance, Iredell, Davie, Davidson, Randolph, Chatham, Wake, Johnston, Rowan, Lee, Lincoln, Gaston, Mecklenburg, Cabarrus, Stanley, Union, Anson, Montgomery, Moore, Richmond, Orange, and Durham Counties.

Adult Leader - a volunteer, usually beyond the age of 19, with a minimum of six hours per year of planned involvement in community 4-H programs.

Rural 4-H Club - a club in which two-thirds of the membership live outside town or city limits.

Urban 4-H Club - a club in which two-thirds of the membership live within town or city limits.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to examine the attitudes and behaviors of youths toward energy conservation. Specifically, the objectives were to determine attitudes and behaviors of youths toward energy conservation, to determine the influence of energy education on attitudes and behaviors of youths, and to discover whether or not there was a correlation between age, sex, geographic location, and prior energy conservation experiences as related to energy conservation attitudes and behaviors.

Following the 1973 oil embargo, scholars and researchers began addressing the energy problem with greater vigor than had been done in the past. Domestic and international conditions affecting the world supply and demand for petroleum-based products, the maturation of the Organization of Petroleum Exporting Countries, and the quadrupling of oil prices have been factors that influenced researchers to seek answers to the problem (Warkov, 1978). Much research has been conducted investigating energy consumption and conservation as related to change in attitudes and behaviors of the American consumer. Since energy conservation is a relatively new field of inquiry, most of the studies have been exploratory and descriptive in nature.

For the purpose of this study, the review of literature is divided into seven sections. The sections are: the energy

situation, energy beliefs and attitudes, energy behaviors, relationships between energy attitudes and behaviors, public acceptance of proposed energy policies, youth energy research, and potential energy solutions.

The Energy Situation

> A human population cannot survive without a steady, daily input of energy; and every social and cultural complexity over and above the members' bare survival requires an additional input. An increase in the energy flowing into a system will result in a corresponding increase in goods and services, a larger population, or both. And these, in turn, will stimulate further developments in the group's social structure, its ideology, the variable aspects of its population, and its language (Lenski and Lenski, 1974:80).

For many years geologists have been predicting that the world's supply of fossil fuels used for energy was being depleted at a rapid pace. Yet, it took the 1973 Middle East oil embargo, the long gas lines in 1975, the shortages of heating fuel in 1976, the 1979 Three Mile Island nuclear incident, and the spiraling Organization of Petroleum Exporting Countries (OPEC) oil prices of the 1980's for the American public to realize that there was an energy problem. There were early hints of impending trouble. Landsberg (1974) enumerated a few of these signs: (1) refusal of numerous natural gas utilities to connect new customers, (2) voltage reductions by a number of eastern United States electric utility companies during peak load periods, (3) closing of service stations on Sunday or early on weekdays, (4) frequent confrontations between the major Middle East oil-exporting countries banding together to form the Organization

of Petroleum Exporting Countries, and (5) rising consumer's energy bills.

Energy shortages have reached all levels and factions of the world today while concerns exist in capitals of both the developing world and the industrial countries alike. The scarcity of energy resources would without question have regional, state, and county impact in the United States. President Carter, in a national energy address in April, 1977, placed the energy situation in the context of the "moral equivalent of war" (Gottlieb, 1978). Seasonwein (1980: i) stated:

> America's continuing reliance on imported oil compromises our national security, weakens the dollar in foreign exchanges, and fuels inflation here at home. Yet, oil imports today are nearly twice what they were in 1972. In 1980, the United States will buy about half its oil abroad.

Today, the fact that a severe energy dilemma must be faced by Americans and the rest of the world does not serve as a debatable issue. People are thinking and talking about the energy problems; "energy" has become a household world. Children and parents, teachers and administrators, industrial moguls and architects are all discussing problems related to energy conservation and renewable energy sources (Till, 1979). However, it should be noted that much energy research has found that there was little correlation between belief of a real energy problem and energy-conscious behaviors (Olsen and Goodnight, 1977). Butler (1979) stated that the value of energy was based on the increasing scarcity but this concept had not been clearly conveyed to the users. Consequently, it was concluded

that waste was disregarded and the need for developing energy substitutes was not perceived.

Representative Mike McCormack (1973), Chairman of the Subcommittee on Energy, described the energy crisis by stating that because this was a new phenomenon which occurred suddenly, the public was experiencing great difficulty in comprehending the magnitude of energy forecasting problems. McCormack (1973:8) summarized, "The twentieth century will be marked in history as an incredible orgy of the burning of natural gas and petroleum."

Energy Beliefs and Attitudes

A belief in the existence of an energy problem and a positive attitude toward energy conservation must be developed before the general public will devote time and effort toward an energy conservation ethic. Therefore, these beliefs and attitudes must be explored and reviewed to evaluate progress that has been made.

The belief that there is a real energy problem has been fairly widespread in the United States. Although actual percentages varied among researchers, studies have shown that approximately 50 percent of the American public believe that there is a long-term energy problem (Gallup, 1977; Gottlieb and Matre, 1976; Lopreato and Meriwether, 1976; Milstein, 1978; Murray, 1974; and Thompson and MacTavish, 1976). A nationwide survey conducted by Harris (1977) also supported this concept as 82 percent of the 1,459 adults interviewed expressed the opinion that the energy problem was a serious one.

The League of Women Voters of the United States (1979) conducted outreach programs to examine energy-related attitudes. The programs were implemented over a period of nine months and were focused on disseminating information to the general public on how to use home energy more efficiently and involved energy programs in four communities nationwide. Public meetings to provide information on home energy consumption and energy saving techniques, how-to clinics to demonstrate energy-efficiency techniques, and clearinghouse services as follow-up to meetings and clinics were used as awareness and learning strategies.

As a result of program assessment, it was reported that the pilot programs developed an increased citizen awareness of the importance of energy conservation in the home. Based on interviews with community residents and participants in the surveys, the following generalizations were made regarding attitudes of respondents: (1) a majority of participants expressed an opinion that an energy shortage existed in this country; (2) most participants were convinced that a need for energy conservation did exist; and (3) individuals felt that they could make an impact on reducing energy consumption but seemed willing to undertake only those easy-to-do conservation methods and practices.

McKenna and Nixon (1979) assessed the influence of geographic locations as related to attitudes toward energy conservation. Attitudes and actions of a group of rural and urban Cooperative Extension clientele from three counties in Colorado were compared. The two groups of respondents viewed energy problems differently. Sixty-two

percent of the urban residents expressed concern that there may be an energy shortage in the year 2000. Only 44 percent of the rural residents expressed the same concern. Thirty-five percent of the rural participants credited oil and natural gas companies for creating the energy situation as compared to 21 percent of the urban residents expressing similar beliefs.

Of the alternative energy sources examined, solar energy was ranked highest by rural and urban residents, 77 percent and 92 percent, respectively. Nuclear energy received the lowest positive responses, with a 28 percent ranking by rural residents and 38 percent by urban residents. When steps to save energy were considered, a greater number of rural than urban respondents said they would spend money to conserve energy. However, over 90 percent of both groups agreed to turn down thermostats and turn off unnecessary lights and appliances.

It was summarized that urban dwellers believed that there is an energy crisis and expressed concern for a decreasing energy supply. Conversely, while rural residents may not be convinced that there is an energy crisis, the study indicated they were more likely to cut back on energy consumption than urban residents.

Hoff (1976) found differences in attitudes related to geographic location from another aspect. The researcher conducted a study to assess the attitudes of vocational agricultural students, students' parents, vocational agriculture teachers, and energy experts toward the energy crisis in agricultural production in Missouri. It was found that the responses of the students, parents, and teachers were

significantly different from the energy experts. Experts believed that the fuel shortages were real and that taxes on fuel should be used to reduce consumption, whereas students, parents, and teachers believed that the fuel shortage was artificial. Teachers and experts believed that schools should teach energy conservation since students were perceived as being poorly informed about energy issues. One additional finding indicated that the attitude of students and parents was affected by location, size, and type of farm.

Davidson (1977) directed a study in Dallas County, Texas, to ascertain homeowners' attitudes and decisions concerning energy conservation features as related to residential housing. The findings indicated that the homeowners sampled were aware of the energy problem. Of the respondents, 90 percent concurred that the thermostat should be lowered to save energy. Eighty-two percent agreed that turning off lights was a way to save energy in the home and should be practiced. Davidson recommended energy conservation education for the masses. It was concluded that it was imperative that home energy users change consumption practices and that in order for this reduction to occur, consumers must be informed of ways to conserve energy.

A study which described the energy-related attitudes of several different groups of science students and science teachers, both before and after utilizing an energy-environment simulator, was conducted by Dunlop (1978). Simulation was substituted for actual experience in order to persuade change to occur. Variables included in the study were population growth, personal energy use, and the

distribution of natural resources. The findings revealed that significant changes occurred in attitudes toward energy conservation as a result of the treatment. It was suggested that the energy environment simulator was responsible, at least in part, for this change.

Ritchey (1978) stated that the lack of a totally positive attitude on the part of the general public toward the energy problem and its significance was not surprising. Reference was made to the point that it was of most utmost urgency to provide reliable data about energy, its management and consequences, so that people would understand, believe, and become concerned over the real issues.

Energy Behaviors

The crucial questions in energy conservation efforts have been whether or not the general public was trying to save energy and what could be done to influence them to continue to conserve. Many studies supported the findings of Cunningham and Lopreato (1977:75) that "consumers were willing to make substantial efforts to conserve energy as long as they were not forced to spend substantial sums of money or experience a negative impact on their lifestyle."

McNew (1979) conducted a study to ascertain the impact of residential energy costs on housing related decisions of the elderly in two Arkansas towns. It was summarized that income, education, sex of household head, size of household, role of respondent, size of living space, air conditioning, certain types of heating equipment, and insulation were all great determinants of energy costs. The

researchers found that knowledge of energy conservation did not always mean that it was put into practice. Respondents who knew about energy conservation did not necessarily follow energy conservation practices, and thus consumed more energy. McNew concluded that the behavioral scores indicated that most families will continue to use energy as long as the energy bills can be paid.

White and Rudakov (1979) utilized the Nebraska Annual Social Indicators Survey to obtain data from 1882 Nebraskans concerning home energy use. The telephone survey asked participants at what temperature home thermostats were set during the day in the winter (1978-1979), whether there was a change from last year, and if so, by how many degrees. It was found that Nebraskans did not meet the federal targets of 65°F during the day and 55°F at night for home energy conservation. The average thermostat settings for the 1978-1979 winter were 69°F and 67°F, respectively. No difference between the mean temperatures among households were noted. However, households with elderly persons or persons in ill health tended to keep homes one degree warmer in winter. The relationship between energy cost and energy use was neither simple nor direct. It appeared that besides totally economic motives there were many other reasons behind energy reduction. It was concluded that if new and substantial energy savings were to be achieved, more pressure, both economic and social, would need to be applied. Furthermore, obstacles to public acceptance must be identified and overcome.

Smith (1976) investigated the changes in energy prices as related to lifestyles and possible changes in demand for consumer

goods and services. A national probability sampling design was used and personal interviews were conducted in 1,400 households. The results of the study indicated that three-fourths of the households in the sample had experienced an increase in energy cost since 1974, and had subsequently made some type of energy reduction in the home. Lighting and heating were the areas mentioned by over 50 percent of the respondents as areas in which reductions were made. In addition, an equal number was noted as being willing to tolerate some environmental discomfort in the winter months and reduced home heating. Only 9 percent stated a willingness to use less energy for recreational activities such as watching television or listening to radios or stereos.

The value patterns of husband and wife couples in the adoption rate of household energy conservation practices were explored by Hogan and Paolucci (1979). Family management conceptual framework, relationships among values, contextual variables, and adoption of energy conservation practices were examined. Data were collected from 157 families in a three-county area in Michigan. Both personal interviews and self-administered questionnaires were utilized. The value of eco-consciousness was found to be positively correlated to the wife's education, husband's education, and his occupation. The findings of the study supported the family management framework and an interdependence of value and practice as related to energy conservation.

Ford Foundation Research conducted by Freeman et al. (1974) investigated the relationship between energy use and various

socioeconomic factors. The study was based on two national surveys. The researchers concluded that there was a direct relationship between family income and energy. The more money a family earned, the more energy it consumed. However, the relationship between energy consumption and the percentage of income spent for energy was reversed. The low-income families spent a larger percentage of wages on energy than did the higher income families. The data concerning housing characteristics, appliance ownership, living habits, and automobile ownership and use suggested that lower income households used most of the energy consumed for functions closely related with basic well-being.

Relationship Between Energy Attitudes and Behaviors

The controversy between energy attitudes and behaviors did not begin until about ten years ago. Zimbardo and Ebbesen (1969) found that attitudes were not generalized predictors which were followed by corresponding changes in behavior. Positive attitudes were not sufficient to lead to behavioral changes. Wicker (1969) concluded after reviewing attitude and behavior studies that overt behaviors could not be accounted for by attitudinal data. It was cited from several studies that behaviors were more consistent with attitudes when behavioral commitments were assessed before attitude measurements were obtained. The findings from Wicker recommended that separate attitudinal and behavioral measures should be taken. In addition, it was suggested that behavioral responses should not only be assessed by the respondent's verbal report of personal behavior but unobtrusive behavior measurements should be made when feasible.

Lounsbury (1973) and Morrison (1975) supported the theory discussed by Zimbardo and Ebbesen (1969) and Wicker (1969). Lounsbury found that there were differences in attitudes and behaviors related to environmental issues. The researcher recommended that environmental attitudes not be utilized as primary indicators for environmentally related behaviors. Morrison (1975) found that energy consumption in single-family dwellings are related to components of lifestyle and behavior, as well as the physical housing factors. In addition, it was stated that belief in the reality of the energy problem did not relate strongly to consumption patterns.

A study conducted to determine if socioeconomic variables and attitudes of consumers were related to energy conservation behavior was completed by Bailey (1979). A model which included variables affecting energy consumption, attitudes toward energy conservation, and energy conservation was developed. It was found that attitudes operated as an intervening variable between the socioeconomic variables and behaviors. It was concluded that socioeconomic variables exerted a direct influence on attitudes and behaviors and an indirect effect on behavior through attitudes. The socioeconomic variables had a stronger relationship with behavior than attitude. Bailey recommended that energy conservation policies and programs be designed with incentives to bring behavioral changes, such as tax deductions for energy conscious behavior, as well as programs implemented to influence people's attitudes.

Dunnermeyer (1977) conducted research concerning energy consumption by breaking the areas into two parts, the substantive level,

defined as social status, house-related factors such as size of house, and attitudes toward the environmental and energy consumption, and the methodological level, defined as the level in which correlation of attitudes and behaviors was examined. A model was designed to predict the levels of energy consumption and included the following variables: (1) social status as operationalized by formal years of schooling, occupational status of the household head, total family income per month, and assessed evaluation of respondent's property; (2) size of the house as measured by the cubic feet contained within the structure; and (3) attitudes toward energy consumption as operationalized by the salience of a generalized attitude toward the environment, the priority of a generalized attitude toward the environment, opinions toward energy conservation, and stated behavioral intentions toward practicing a series of energy conservation measures. It was concluded that total family income was the best single predictor of consumption practices. Opinions, salience, and priority among the attitudinal items were not found to be significantly correlated with consumption. However, behavioral intention items showed moderately strong correlations with consumption.

Partain (1979) examined the informational approach recommended by Davidson (1977). Research was conducted to determine the effects of an energy education in-service program by assessing the energy cognizance, attitudes toward energy conservation, and the perceived energy conservation behavior of educators before and after the in-service training program. A quasi-experimental pretest-posttest

study was conducted with the teachers participating in the in-service meetings in one school district in Texas.

Analyses were made both by school campus and by elementary and secondary levels. Significant differences by campus were revealed in both pretest and posttest on attitudes and in the posttests on cognizance. There was a significant interaction between campuses and the occasion of cognizance testing. When testing by levels, significant gains were noted in both cognizance and attitude between pretests and posttests. In addition, a significant interaction was found with the elementary teachers having a lower pretest mean and a higher posttest mean than the secondary teachers. The treatment was evaluated as being effective in improving levels of cognizance and attitudes, but was noneffective in changing levels of perceived energy conservation behavior. Thus, the theory that the informational approach alone does not change behavior was supported by Partain.

In a five-year study conducted by Morrison et al. (1978), beliefs, attitudes, and reported behaviors related to energy in the areas of food consumption, transportation, housing, and finances were investigated. The study revealed that rural respondents tended less often to express a belief in an energy problem than did urban residents. Respondents also believed that the energy problem would intensify in the near and distant future. The higher income, well educated, larger families in the middle life cycle, living in large houses, used more energy than other respondents. In contrast, the same families reduced energy consumption by a comparable amount as did the poor, elderly, and small families in small houses.

Christner (1979) concluded that unless structural and cognitive variables were changed, current attitudes and practices about energy conservation were likely to continue. It was further stated that there were currently no rewards or punishments connected with changes in energy behavior. Christner suggested that if conservation were widely associated with status of other positive evaluations, there would be more incentive to conserve.

Public Acceptance of Proposed Energy Policies

> Energy policy is, in fact, probably the most difficult issue faced by the country in many decades, primarily because the interests involved are extremely convoluted and interrelated with other issues. The observation that energy underlies all other facets of life is painfully obvious: energy means production, employment, income; it also means pollution, extensive land use, and voracious water consumption (Cunningham and Lopreato, 1977: 94).

The purpose of a survey conducted shortly following President Carter's national energy address in 1977 (Gottlieb, 1978) was to obtain a clearer understanding of how the public perceived and evaluated various factors of the energy proposals submitted to Congress. The sample was composed of 493 Texas adults selected from each of the 254 counties in Texas. Findings showed that a majority, 64 percent, believed that the nation was confronted by a long-term energy crisis. Early surveys conducted in 1974 had shown only 28 percent of the persons interviewed agreed that the energy situation was a long-term problem, while 37 percent had the same perception a year later in 1975.

Persons most likely to support the long-term energy program were urban, affluent males who were college graduates. Females were three times as likely as males to express a "don't know" opinion. Age also was associated with observed differences; younger and older respondents were not convinced that an energy problem existed. It was noted that 90 percent of the participants agreed that Americans wasted too much energy in needless consumption.

Hall (1978) conducted a study designed with two research goals: first, to define the substantive political issues of energy conservation, and second, to identify the policymaking system which led to the formulation and implementation of public policy with regard to energy conservation for the consuming sectors. It was found that a fragmented, decentralized policy existed which would require strong national leadership for the implementation of technical fix and regulatory programs. However, some policy options such as various kinds of education exhortation and incentives could best be handled by states and localities. The research reinforced the concept that there was no single "best" category of policy alternatives for energy conservation problems and issues. Instead, it was concluded that alternatives must be tailored to meet specific sectional needs.

In 1977, just after California had experienced one of the worst droughts in history, Leonard-Barton and Rogers (1979) interviewed 215 Palo Alto homeowners. The participants were asked about their views on energy and water conservation and to what extent energy-conserving practices had been adapted in the home. Adaption levels were predicted by the homeowner's assessment of personal consequences related

to energy conservation practices, ability to make home repairs, past experiences with shortages, and awareness of a social norm or a conservation ethic. The results indicated that practical and specific "how to" information, rather than persuasive communication aimed at changing general energy-related beliefs, was needed in the promotion of energy conservation.

Jolly and Gitu (1978) described ways that Davis, California, was saving energy through developing an energy-efficient transportation system, establishing standards for new construction, conserving water and recycling waste. Findings stated that energy conservation was more likely to be successful if implemented at the local level. Thus, local policy makers and educators such as home economists could have an important role to play.

Additional findings of this survey were: (1) respondents agreed on the need for reduction of the nation's energy consumption and expected improvements in energy efficiency to achieve much of the savings; (2) respondents supported a pluralistic approach to the nation's energy future and agreed that conservation was the fastest, cheapest, and most environmentally acceptable to the nation's energy options; (3) homeowners stated that cost was the single most important obstacle to improving energy efficiency in the home; and (4) respondents expressed the opinion that industry, government, and the "average person" would conserve energy. In summation, the survey revealed a substantial constituency for conservation and pointed to new public policies to assist in putting conservation efforts to work.

Dillman, Tremblay, and Dillman (1977) conducted a statewide mail survey of households in the State of Washington to ascertain public acceptance of nine proposed policies for saving energy in the home. The policies were grouped into the following four categories: mandatory insulation of existing homes, temperature limitations in homes, structural changes in homes, and space reduction within and around homes.

A majority of participants expressed acceptability concerning mandatory insulation. The policies dealing with limitations of temperature and structural changes in new homes were accepted by one-third to one-half of the respondents. The least favorable response was given to the policies directed at reducing the amount of space in homes. Demographic factors such as education, income, and home-ownership were slightly associated with acceptance of any of the policies. Older people were more likely to reject temperature limitations in favor of less space, while larger households showed tendencies toward rejecting less space in favor of lower temperatures. It was concluded that policies involving mandatory insulation would be most likely to succeed while policies involved with changing the size of homes would most likely receive public resistence.

The viewpoint was discussed by Dillman, Tremblay, and Dillman (1977) that society could not rely on government to solve all problems. Three assumptions were pointed out: (1) society could not continue to function smoothly if an inordinate amount of energy was required for home usage; (2) a large portion of the energy presently used in households was wasted; and (3) rising prices for residential

fuels and gasoline were creating financial burdens for many American families.

Youth Energy Research

Change in attitudes and behaviors cannot occur without a source of knowledge and information. Many schools, and state and local agencies have included energy education as a part of the curriculum. Thus, the approach is still in the experimental stages and research is forthcoming.

In a study directed toward youths in 1977, Stout explored the level of cognitive functioning and attitudes of high school home economics students using two modes of instruction, expository and guided discovery. Ten lessons on residential energy resource management were utilized in twelve Iowa high school home economics classes. It was concluded that there were no significant differences in attitudes or achievement scores for subject or classes as a result of the treatment. With students' grade level, sex, and grade average as demographic variables, the sex of the participant was the only variable in which a significant difference was found. It was also found that the ability of the students made a significant difference in all scores except attitude scores. Therefore, Stout concluded that the ability levels varied significantly with achievement measures but not with attitude measures.

McCampbell (1978) conducted a study to determine the extent to which selected junior high school students in one public school system in Texas possessed knowledge in the field of energy. A

questionnaire was developed to evaluate four basic areas of energy knowledge: present energy supplies, future energy sources, energy conservation, and power generation. A three-way analysis of variance indicated that females obtained significantly higher mean scores than males. A significant difference was displayed between grade levels. That is, junior high school students in higher grade levels achieved higher test scores than students in lower grade levels. In general, the researcher noted that the analysis of scores indicated a low level of knowledge possessed by the respondents in regard to the field of energy. It was recommended that the present junior high curriculum be evaluated to determine whether new materials should be introduced in the classroom to increase the students' recognition of the energy situation. In addition, McCampbell reinforced the idea that recognition of the energy situation would aid in the students' perceptions of the solution to the crisis.

A pilot study was conducted by Kushler and Stevens (1978) in Michigan to collect data on energy conservation attitudes and behaviors of 42,400 high school youths from 161 schools in eight states. The purpose of the study was to obtain information which would be useful in assisting educators to plan, conduct, and evaluate energy conservation education efforts. The Youth Energy Survey, containing a five-point Likert scale, was developed and administered to the students in this study. An analysis of the data showed that females indicated more willingness than males to assume responsibility, make more sacrifices, and take certain actions to save energy. Females

also stated more often than males that individual conservation efforts could have an impact on the energy problem. However, males had more positive views toward increasing the use of nuclear and solar power. When the age and grade variables were addressed, the data showed an upward trend from ninth to twelfth grades, with the twelfth grade indicating the most willingness to conserve energy. The positive relationship continued toward energy-conserving attitudes as students progressed from ninth to twelfth grades. It was also found that males had received more instruction than females and that the students who had received energy conservation instruction overall had more positive attitudes toward saving energy.

Potential Energy Solutions

> Through the fog of pronouncements that dims our perception of the dimensions of the energy crunch, all parties--presidents and prime ministers, oil companies and OPEC, planners and free-marketeers--agree on this much: there are only two answers to the world crisis--produce more energy or use less (Fogel, 1980:1).

Many authors and researchers vary somewhat in semantics, but most agree that energy consumers need to change their habits toward energy consumption. Conservation would be a responsible start toward a real solution to the energy problem rather than postponing an inevitable disaster (Canfield and Sieminski, 1975). Thoreau (1927: 284) stated, "Things do not change; we change."

Rudd and Longstreth (1978) concluded that with adequate energy conservation planning and cooperation of all, the standard of living could be higher, rather than lower, in the conservation-oriented

society of the years ahead. At least society would be making an effort to insure future generations that essential resources would be available.

Montgomery (1973) predicted that it was becoming more and more urgent that the image of man be changed. It was stated that present images of what people and families were like, the kinds of houses they lived in, and the kinds of cars driven were greatly colored by the technological world.

Nine broad proposals for action in the future were outlined by Auchincloss (1979). The issues dealt with decontrol, coping with the Organization of Petroleum Exporting Countries, conservation of coal, synthetic fuels, nuclear power, solar power, transportation, and the federal role. Americans were viewed as already buying fuel-efficient cars and cutting fuel costs by insulating homes. Higher prices and limits on oil imports should, in the author's opinion, encourage even more conservation. Auchincloss (1979:33) concluded:

> There is no single solution to the energy crisis. To wean America from its costly oil habits will require many steps. They will not be easy or painless, but the nation must start to take them now--or the crisis will get worse.

According to Lincoln (1974), consumers, industry, and government would have difficult choices in the future. Choices described were between greater convenience and lower energy bills; high capital costs of conservation measures and long-term savings from increased energy efficiency; and environmental protection and availability of necessary energy supplies.

The general public must learn to use less energy for homes, transportation, and entertainment; and do so without bankruptcy or going back to a primitive way of life was reiterated by Knox (1974). Referring specifically to North Carolina, Finger (1980) stated that the state could never return to the energy independence of 1900. However, it was recommended that the inventiveness of a backwoods' tradition might stimulate creative public energy policies which are needed for the future.

Gore (1981) expressed the viewpoint that the general public, in the realization of a chilling energy crunch, was retooling homes and businesses. It was stated that the American goal presently was to "slash our energy use while maintaining our standard of living ... through greater efficiency, alternative energy sources, and inventive conservation" (Gore, 1981:34).

The following researchers and scholars addressed the energy issues related to the individual and family. Henderson (1980) alluded to the fact that in the past fifty years the American home has changed from a center of production to a center of consumption and that this practice must be reversed.

The question of what an individual or a family could do now or in the near future to be more self-sufficient in energy was explored by Hammond (1974). Several solutions suggested were to change personal habits, lifestyles, and philosophies, and to adapt what an environmentalist might call "right thinking"--making do with less.

Ruffin and Weinstein (1979) concluded that it would become increasingly important to understand energy consumption in the household and to develop quantitative information that could be used in making projections and in testing and evaluating energy policies. The existing literature about decision-making practices of families as they related to energy consumption was discussed by Morrison and Gladhart (1976). Future research was recommended not only on alternative energy supplies and on practical solutions to the current shortages, but also on the coping strategies of families and the implications of those strategies for family well-being.

The importance of the family in the struggle to develop values that embody frugality and the conservation ethic was emphasized by Paolucci (1978). Two challenges viewed by Paolucci were life beyond mere survival depending on the values of social, economic, and political organizations, and human survival depending on adequate amounts of these resources.

Van Meter (1979) concurred with the increased energy efficiency concept, yet recommended that Americans look for new sources of energy. Van Meter (1979:22) stated: "The real goal of increased energy efficiency is to buy the time needed to make new energy sources economical." Ward (1980:14) reiterated: "This energy field is wide open, limited only by imagination and the willingness to spend money to achieve true energy independence."

A "conservation ethic" was called for by Paolucci (1978) and Olsen (1978). The ethic was defined by both researchers as striking a balance between people and resources that could be achieved by

creating a lifestyle based on this goal. Paolucci stated that the ethic should include reducing waste, recycling of waste materials, adapting intermediate technology, becoming labor intensive, using resources prudently, and volunteering to live simply. According to Olsen (1978), the ethic would not be opposed to overall economic growth, but instead emphasized service, technical, professional, and other labor-intensive parts of the economy rather than energy-intensive production processes.

Thrift, conservation, and sharing of resources as the twentieth century neared completion were recommended by Hogan et al. (1980). It was stated that the American citizenry had the responsibility of making decisions which could reduce energy consumption. Furthermore, it was concluded that by doing so, an opportunity to improve the quality of life could be created. Purchase (1980) agreed with Hogan et al. (1980), and further suggested that an energy-conserving attitude be developed. Without desire to save energy, little effort would be devoted to changing habits or seeking ways of conserving. Herman (1980:151) summarized:

> Now is the time to seriously examine current American values, attitudes, and behaviors toward energy use. Changing these values, attitudes, and behaviors to bring about a less energy-intensive lifestyle will take time and effort. Most people resist change, especially when it looks less appealing than what they presently have. Yet, a new way of life less dependent on energy may be not only necessary, but even allow us to develop a higher quality of living.

Summary

It was perceived by researchers and scholars and supported by research data that the majority of the citizenry of the United States believed that a real energy problem exists today and will exist in the future. However, there was evidence that the general public had adopted only minimal conservation practices requiring little change in lifestyle such as turning out unnecessary lights and adjusting thermostats. It was concluded that favorable energy behavioral changes occurred when learning experiences were direct, purposeful, and provided personal involvement in wise decision-making processes and were not merely the presentation of knowledge and facts. Research findings recommended education for the masses that involved learners in a variety of direct and purposeful learning activities and experiences. The fact that youths in the formative years may be a viable audience was also supported by the literature.

CHAPTER III

STUDY DESIGN

The purpose of this study was to examine the attitudes and behaviors of selected youths in Piedmont North Carolina toward energy conservation. The four specific objectives outlined for this study were: (1) to determine attitudes and behaviors of selected youths toward energy conservation; (2) to determine the influence of energy education on the attitudes of selected youths; (3) to determine the influence of energy education on the behaviors of selected youths; and (4) to determine whether or not four variables--age, sex, geographic location, and prior energy conservation experiences--were related to energy conservation attitudes and behaviors. A pretest-posttest true experimental design (Gay, 1976) was implemented permitting the comparison of experimental and control groups with pretest and posttest performances. The experimental design applied to both the assessment of energy attitudes and the observable energy consumption outcome behaviors. The independent variable was energy education, while the dependent variables were attitudes and behaviors toward energy conservation. This chapter presents information concerning the population and sample, instructional materials and strategies, instrumentation, data collection, and data analysis.

Population and Sample

The target population for this study was defined as youths from ages seven to nineteen years who were members of a 4-H club affiliated with the North Carolina Agricultural Extension Service as of September 1, 1980, and who resided in one of twenty-nine counties located in the Piedmont area of North Carolina. Sixteen counties were randomly selected from the Piedmont area of North Carolina (Appendix A). One county, Cabarrus, was eliminated from the study due to scheduling difficulties of 4-H county personnel.

From the remaining fifteen counties, names and addresses of the 4-H agents were secured and a letter was mailed to the agents describing the study and soliciting support. The agents were asked to supply the following pertinent data for each of the clubs in their county: club name, number of members, number of years club had been in existence, names of volunteer leaders, number of scheduled meetings per year, and location of the club. Criteria for selection of participating clubs were a minimum of twelve or more members, two or more years in existence, two or more adult leaders, and nine or more scheduled meetings per year.

Clubs in each county meeting the criteria were stratified as either urban or rural. From the two lists of clubs, fifteen rural and fifteen urban clubs were selected. Seven urban clubs were randomly selected from the urban list to serve as the experimental groups. The remaining eight urban clubs served as the control group. From the rural club list, eight clubs were randomly selected to serve

as the experimental groups; the remaining seven clubs became the control groups.

It was necessary to eliminate a second county, Rowan, from the survey after the data were collected due to an energy competition event the control groups from that county had entered. Therefore, fourteen counties remained in the sample.

Instructional Materials and Strategies

Individual learning materials and strategies were selected from a learning packet on energy conservation entitled "The Energy of the Future," prepared by the 4-H and Youth Department, North Carolina Agricultural Extension Service, which may be obtained from this agency for review. The materials had been reviewed by the State Home Economics Specialists of the North Carolina Agricultural Extension Service and recommended revisions were made. Of these nine mini-units developed and distributed statewide to the 4-H agents in July, 1980, four units were selected for use in this study.

The units utilized in the energy conservation instruction for the experimental groups were: "Your Home Energy Use," "Alternative Energy Sources," "Transportation and Energy," and "Change of Habit for Energy." The learning units included the following subject areas as related to energy conservation: automotive conservation, personal responsibility, solar energy, specific commitment, government and taxes, nuclear energy, home heating and cooling, job availability, and general feasibility and favorability of energy conservation.

Special emphasis was placed in the development of these materials that involved youth learners in a variety of direct and purposeful learning activities and experiences. Suggested teaching strategies included: materials and construction techniques for assembling a sun-powered hot dog cooker, family energy saver contest, patterns for development of an energy ethic, demonstration materials and instructions for temperature changes in the sun and shade, an energy match game, weatherproofing investigation techniques, a home energy search map, and instructions for computing gas mileage per gallon for automobiles (Appendix A).

A conference was conducted with the 4-H agents and adult leaders of the experimental group in each county selected for the study. The purpose of the conference was to review materials for instruction, discuss learning strategies, provide general instruction for administering the pretest and posttest, and explain the youth-consent form. A kit of visual aids and teaching materials, as well as specific instruction for program planning, were given to the adult leaders. Energy instruction was provided through activities that were designed for a "4-H Energy Fun Day." The concept of having a one-day activity program was believed by the 4-H administrative staff and 4-H specialists to be most appropriate for the target population.

The 4-H adult leaders were instructed to use the regular procedures for notification of the club members concerning the October meeting and to mail a special invitation to each club member. To encourage interest and community support for the project, a media release publicizing the "4-H Energy Fun Day" was included in the

energy kits. These techniques were chosen to encourage and enhance individual participation and involvement on the part of the youths.

Instrumentation

The Youth Energy Survey (Kushler and Stevens, 1978), with minor adaptations, was selected for this study. The questionnaire, useful to educators, program evaluators, and others who are working or doing research in the field of energy, was developed for the Michigan Extension Service to be used with high school youths.

The instrument was piloted in 1978 in approximately 161 high schools, grades nine through twelve, in eight states. The sample consisted of over 23,000 students living in locations selected on the basis of the state's representativeness of regional weather and national population characteristics.

According to Kushler and Stevens (1978), the Youth Energy Survey was found to have an internal consistency of .90 or higher for three different samples of 500, 11,000, and 14,000 in Michigan high schools. The validity of the instrument was measured by documentation of statistically significant relationships between the attitude scale and subscales with independent teacher assessment of student attitudes, with self-reported behavior, and with self-reported demographics.

Due to the larger variance of ages in the sample, permission was requested and obtained from the developers of the Youth Energy Survey to use and modify the instrument for the target population of this study. Partin (1950) recommended that it was best to aim at a

comprehension level for the least intelligent and least educated of the group to be surveyed. Therefore, educators and specialists in energy education, home economics education, and 4-H youth education were contacted and consulted about their views and recommendations concerning reducing the reading and comprehension level of the questionnaire. These modifications were implemented and the Fog Index Readability Appraisal (Gunning, 1964) was employed to verify the appropriate reading level. The instrument, modified for approximately a fifth-grade level, will henceforth be identified as the North Carolina Youth Energy Survey (NCYES) (Appendix B).

A pilot study was conducted in September, 1980, to obtain probable variance and assure the readability of the instrument. The fifty-two youths participating in the pilot study were residents of Harnett and Wilson Counties, located in Eastern North Carolina. Each participant was between seven and nineteen years of age and an active member of a 4-H Club affiliated with the North Carolina Agricultural Extension Service. The pilot study participants were not included in the target population since the two counties were not located in Piedmont North Carolina. Based on the pilot study, the variance was determined and findings concerning the questionnaire instructions and format were incorporated.

The NCYES was divided into three sections. The first section examined energy-conscious attitudes and utilized a common attitude measure Likert-type scale consisting of a series of forty-six statements followed by a five-point response continuum. The respondents' choices were: (1) Strongly Agree, (2) Agree, (3) Undecided,

(4) Disagree, and (5) Strongly Disagree. A score of one (Strongly Agree) was considered the highest score and indicated the most favorable attitude change toward saving energy. In contrast, a score of five (Strongly Disagree) indicated the least favorable attitude toward energy consciousness. The scoring format was reversed to assure validity where negative responses were appropriate. Therefore, the lower the numerical score, the more favorable the youth's attitude toward energy conservation. The scores from this section of the survey were computed in two ways. First, the responses were averaged within each of nine subscales (Appendix C), producing change scores for each of the subscales. Secondly, the individual subscales were combined to produce one attitudinal change score, giving a total for that scale.

The second section of the questionnaire consisted of eighteen dichotomous statements designed to elicit a response of Yes or No regarding energy conserving behaviors. A score of one (Yes) was the most favorable score, while a score of two (No) denoted a less favorable response. Therefore, the lower scores reflected a more favorable behavior toward energy conservation. The scores for this section were computed in like manner as the attitudinal scores.

A pretest and posttest score for each of the participants were obtained. A change score was computed by subtracting the average pretest score from the average posttest score. For example, if a youth had a posttest score of 3.2 and a pretest score of 3.3, the change score would be -.1, thus indicating a favorable attitude/ behavior change score.

The two scales denoted total responses for attitudes and behaviors of the youths. The nine attitudinal subscales divided responses into subject areas (Appendix C). Behavioral scales followed the same pattern; however, there were only five subject areas for which behavior was measurable. The behavioral items were divided further into two sub-areas: family behaviors and youth behaviors. In order to simplify analysis discussion, each attitudinal or behavioral subscale was assigned an acronym. The scales, subscales, and acronyms for attitudes and behaviors are:

Attitudinal Scale

Subscale 1 - Automotive Conservation (AUTOCO)

This subscale contained nine statements and was intended to measure the youth's willingness to use a car less to save energy and the youth's expressed desire for parents to do the same.

Subscale 2 - Lack of Personal Responsibility, Sacrifice (SACRIFICE)

The subscale contained seven items and expressed the degree to which the youth felt he should not have to take responsibility nor make sacrifices to conserve energy.

Subscale 3 - Solar Energy (SOLAR)

This measure contained three items and measured the youth's attitude toward using solar energy.

Subscale 4 - Willingness to Make Specific Commitment (WILLINGNESS)

This subscale contained six items and stated the youth's willingness to devote personal time to work in energy conservation activities.

Subscale 5 - Government and Taxes (GOVTT)

This subscale indicated the degree to which the youth believed that government should prioritize energy conservation and that taxes should be used to promote energy conservation. This subscale contained seven items.

Subscale 6 - Nuclear Energy (NUCLEAR)

This subscale measured the youth's attitude toward the use of nuclear energy and contained one statement.

Subscale 7 - Home Heating and Cooling (HOMETEMP)

The topic indicated the youth's willingness to reduce the use of heating in the winter and air conditioning in the summer. The subscale consisted of two items.

Subscale 8 - Job Availability (JOBAV)

These items showed the youth's perception that energy conservation will increase the number of available jobs. The subscale contained two items.

Subscale 9 - General Feasibility and Favorability (FAVOR)

This subscale contained nine items and measured the degree to which the youth believed that individual conservation efforts can produce an impact on the energy problem.

Behavioral Scale

Subscale 1 - Automotive Conservation (AUTOCO)

This subscale contained six statements and was intended to measure the youth's behavior toward using a car less to save energy.

Subscale 3 - Solar Energy (SOLAR)

This measure contained one item and measured the youth's behaviors toward using solar energy.

Subscale 4 - Willingness to Make Specific Commitment (WILLINGNESS)

This subscale contained four items and stated youth's behavior toward devoting personal time to work in energy conservation activities.

Subscale 7 - Home Heating and Cooling (HOMETEMP)

This topic indicated the youth's behavior toward reducing the use of heating in the winter and air conditioning in the summer to save energy. The subscale consisted of three items.

Subscale 9 - General Feasibility and Favorability (FAVOR)

This subscale contained four items and measured the degree to which the individual believed that conservation efforts could produce an impact on the energy problem.

The last section of the questionnaire consisted of statements requesting demographic data such as age, sex, geographic location, and prior energy conservation experiences. Participants were requested to sign a consent form indicating their awareness of the study and willingness to participate.

Data Collection

The NCYES was administered by the 4-H adult leaders to the control groups at the beginning of a regularly scheduled meeting in October, 1980. The experimental groups were administered the

questionnaire at the beginning of the "4-H Energy Fun Day" during October and November, 1980. Both control and experimental groups were readministered the NCYES to determine changes in attitudes and behaviors toward energy conservation for those youths who received energy instruction and those who did not, at the beginning of the club's regularly scheduled meetings in January, 1981.

Each participant was asked to code questionnaires using the same three initials for the pretest and posttest. The adult leaders verified that the youth's initials were included correctly and that the questionnaires were completely filled out as they were returned.

Data Analysis

As the NCYESs were returned, the data were coded for statistical computation. Inferential statistics, including *t*-tests, analysis of variance, and correlation techniques, as well as descriptive statistics, were used to analyze the data to determine significant statistical differences between experimental and control groups. A .05 level of significance was used throughout the study.

CHAPTER IV

ANALYSIS OF FINDINGS

The purpose of this study was to examine the attitudes and behaviors of selected youths in Piedmont North Carolina toward energy conservation. The four specific objectives outlined for this study were: (1) to determine attitudes and behaviors of selected youths toward energy conservation; (2) to determine the influence of energy education on the attitudes of selected youths; (3) to determine the influence of energy education on the behaviors of selected youths; and (4) to determine whether or not four variables--age, sex, geographic location, and prior energy conservation experiences--were related to energy conservation attitudes and behaviors.

A total of 331 pretests from the control and experimental groups were returned, 155 and 176, respectively. The youths who completed the pretest but not the posttest followed no set pattern according to groups or demographic data. Eighty-nine percent of the youths in the experimental groups and 82 percent of the youths in the control groups completed the posttest. Only data from participants who completed both the pretest and posttest were analyzed. Thus, data were available from a total of 284 youths for analysis (Table 1). In some instances, however, the totals varied due to missing data on individual items. The results and findings of this study are presented in four parts: description of participants, description of data, statistical analysis of hypotheses, and discussion of findings.

Table 1

Number and Percentage of

Participants by County

	Control		Experimental	
County	Number	Percent	Number	Percent
Anson	10	8	11	7
Davie	20	16	7	4
Durham	10	8	12	8
Forsyth	6	5	9	6
Guilford	8	6	17	11
Iredell	10	8	29	19
Lee	5	4	13	8
Lincoln	6	5	5	3
Montgomery	8	6	11	7
Moore	6	5	6	4
Randolph	12	9	9	6
Stokes	17	13	10	6
Surry	4	3	7	4
Wake	5	4	11	7
Total	127	100	157	100

Description of Participants

The demographic data from this study described participants according to age, sex, geographic location in which the youths lived, and prior energy education experiences. Each of these characteristics was examined.

Age

The design for this study limited participation to youths from ages seven to nineteen. Over two-thirds of the youths were ages ten through thirteen, thus the frequency distribution was skewed to the right. Eleven was the mode for the age groups while the mean was approximately twelve. Within the upper age limits (19) and lower age limits (less than nine), there was one percent or less in the control and experimental groups (Table 2).

Sex

Of the youths who responded to the questionnaires, approximately 60 percent were female while the remaining 40 percent were male (Table 2). The division of sex in this sample was comparable to the overall statewide 4-H membership statistics in North Carolina.

Geographic Location

When considering the geographic location in which the respondents lived, approximately two-thirds of the youths resided in the county (Table 2). Almost an equal number of the remaining respondents lived in towns or cities with a population of less than 10,000 and more than 10,000. A slightly higher proportion of the

Table 2

Number and Percentage of Participants by

Age, Sex and Geographic Location

	Control		Experimental	
Age	Number	Percent	Number	Percent
<9	1	1	0	0
9	10	8	20	14
10	22	18	21	14
11	15	12	29	20
12	20	16	22	15
13	16	13	23	16
14	11	9	6	4
15	12	10	8	5
16	12	10	11	7
17	3	2	5	3
18	0	0	1	1
19	1	1	1	1
Total	123	100	147	100
Sex				
Female	76	60	97	65
Male	50	40	51	35
Total	126	100	148	100
Geographic Location				
County	81	66	100	68
Town < 10,000	21	17	29	20
Town > 10,000	20	17	18	12
Total	122	100	147	100

experimental groups lived in towns or cities with a population of less than 10,000.

There were almost two times as many county residents as urban residents participating in the study. The ratio of urban youths and rural youths was somewhat higher for this study than in the geographic location for 4-H membership statistics statewide. This variation was due to the stratification by rural and urban of youths at the onset of the study.

Prior Energy Conservation Experiences

Prior energy conservation experiences were ascertained by three different approaches: number of courses in school, participation in a 4-H energy conservation class, and involvement in an energy assignment or project. Data shown in Table 3 indicated that more youths in the experimental groups than in the control groups had no prior exposure to energy conservation courses in school, 47 percent as opposed to 35 percent, respectively. When asked to report on the number of school courses in energy conservation in which the youths had participated, the control groups had been involved in energy education to a higher degree than the experimental groups (65 percent versus 53 percent, respectively).

When asked whether or not the youths had participated in a 4-H energy conservation class, approximately 60 percent in both control and experimental groups had not participated in such a class. In like manner, less difference existed between control and experimental groups in the participation in a 4-H energy conservation class (approximately 40 percent in both groups).

Table 3

Number and Percentage of Participants Involved

In Prior Energy Conservation Experiences

	Control		Experimental	
Number	Number	Percent	Number	Percent
School Courses				
None	44	35	71	47
One	55	43	55	37
Two or More	28	22	24	16
Total	127	100	150	100
4-H Class				
Yes	51	40	59	41
No	76	60	86	59
Total	127	100	145	100
Assignment or Project				
Yes	51	40	56	37
No	76	60	94	63
Total	127	100	150	100

Examination of involvement in an energy conservation assignment or project between the experimental and control groups revealed that the control groups had been slightly more active than the experimental groups. However, the difference appeared negligible.

Description of Data

In order to examine the attitudes and behaviors of youths toward energy conservation, data obtained from the survey were tabulated in frequency tables and examined (Tables 4 and 5). Tabulation from the 46 questions that composed the attitudinal section of the survey revealed that 48 percent of the youths from the control groups expressed favorable energy conservation attitudes (Strongly Agree or Agree) for 60 percent or more of the questions on the pretest. A higher percentage, 60 percent, of the youths from the experimental groups expressed favorable attitudes for 60 percent or more of the questions on the pretest. Examination of the posttest showed that one-half of the youths in control groups and 56 percent of the youths in experimental groups indicated favorable energy conservation attitudes for 60 percent or more of the questions.

The control groups made a slight improvement (2 percent) toward favorable energy-conscious attitudes while the experimental groups indicated 4 percent less favorable attitudes on the posttest from the pretest. Those questions responded to most favorably by both groups (Questions 11, 19, 21, 22, 36, and 41) dealt with automotive conservation and the desire for state and federal governments to put a high priority on energy conservation. Questions to which the

Table 4

Percentages of Youths With Favorable Energy Conservation Attitudinal Responses (Strongly Agree and Agree)

	Pretest		Posttest	
Questions	Control	Experimental	Control	Experimental
1	43.51	40.80	38.10	49.02
2	72.90	83.53	66.93	83.76
3	61.93	65.52	56.70	69.68
4	72.07	68.39	74.81	76.13
5	47.74	53.98	50.00	47.43
6	39.87	53.98	54.33	58.33
7	52.90	67.43	67.20	65.38
8	76.31	75.29	77.95	83.76
9	59.09	63.07	55.91	57.69
10	44.51	50.29	49.21	57.69
11	79.22	82.28	87.40	84.41
12	66.67	73.29	74.40	78.20
13	75.16	73.71	73.02	71.79
14	63.63	70.45	64.56	72.26
15	62.58	70.45	69.29	72.90
16	52.94	60.23	51.97	63.45
17	71.24	83.43	77.96	80.65
18	59.47	52.57	62.99	70.32
19	83.44	90.23	86.61	92.21
20	51.63	54.28	57.48	58.44
21	89.40	87.50	90.47	90.32
22	80.52	87.50	80.16	82.05
23	65.79	68.00	62.10	65.38
24	52.00	56.57	59.06	60.90
25	58.83	74.44	70.86	68.59
26	49.01	64.00	57.94	60.89
27	51.33	46.03	54.91	57.05
28	41.17	50.29	44.44	55.13
29	40.40	36.57	42.07	40.00
30	48.05	52.57	55.56	53.85
31	49.02	58.53	53.55	62.18
32	73.33	75.56	80.65	78.71
33	69.28	68.75	78.57	73.55
34	46.10	60.00	55.90	60.64
35	47.40	48.57	53.55	51.28
36	79.22	76.71	76.98	70.97

Table 4 (Continued)

	Pretest		Posttest	
Questions	Control	Experimental	Control	Experimental
37	64.48	76.44	79.37	85.72
38	45.03	54.55	49.61	60.64
39	72.26	82.08	79.36	83.12
40	54.19	59.43	55.91	66.24
41	80.00	75.00	76.37	81.05
42	66.45	72.73	63.77	80.00
43	52.90	65.14	59.06	76.13
44	56.21	67.61	59.84	72.90
45	38.06	29.14	33.07	31.62
46	61.93	49.44	53.55	67.10

Table 5

Percentages of Youths With Favorable Energy Conservation Behavioral Responses (Yes)

	Pretest		Posttest	
Questions	Control	Experimental	Control	Experimental
Family				
47	23.53	20.57	22.22	20.13
48	50.30	45.14	44.44	44.52
49	67.53	69.71	77.78	82.35
50	27.74	32.56	23.02	30.97
51	18.83	9.14	11.20	5.19
52	54.25	54.91	53.97	62.18
53	37.25	26.01	50.00	42.31
54	45.75	42.69	46.83	32.05
Youth				
55	37.66	35.26	50.00	48.08
56	36.18	24.86	27.78	29.49
57	45.10	42.20	47.62	51.92
58	70.78	67.46	72.22	70.51
59	86.93	84.71	84.13	95.48
60	30.72	26.90	33.60	25.16
61	48.70	53.22	54.76	68.39
62	26.32	19.88	19.84	22.08
63	60.39	60.47	62.29	71.24
64	42.11	35.67	41.46	28.48

youths indicated the least favorable responses (Questions, 1, 5, 28, 29, and 35) dealt with increasing taxes and nuclear power. An examination of the mean scores for each question indicated that in no incident was the mean score greater than 2.96, thus concluding that scores were skewed toward the favorable end of the continuum.

Of the 18 dichotomous questions concerning energy conservation behaviors, 22 percent of the youths answered positively (Yes) for 60 percent of the questions from both the control groups and experimental groups on the pretest. When reviewing the posttest, 17 percent in the control groups indicated favorable responses for 60 percent or more of the questions from the energy conservation behaviors. The experimental groups, however, responded favorably for one-third of the questions 60 percent or more of the time. Those reported energy conservation behaviors that were indicated most often (Questions 49, 59, and 63) dealt with lowering the thermostat, turning out lights, and driving less. Less reported behaviors (Questions 47, 51, and 62) were indicated for adding insulation to the home, installation of a solar collector, and riding a public bus. The mean score for behaviors ranged from 1.01 to 1.92. Examination of the behavioral section of the survey by youth and family behaviors indicated that for youth-controlled behaviors, both the control and experimental groups had a greater percentage of favorable energy conservation behaviors than did family controlled behaviors.

Tests of Hypotheses

In the following section each of the ten hypotheses is examined, statistical procedures discussed, and the results analyzed and interpreted. Hypotheses one and two utilized the *t*-test procedure as a primary method of analysis, while correlation techniques were used to examine hypotheses three and four. The third technique, two-way analysis of variance (ANOVA) was employed to examine the remaining

six hypotheses. This ANOVA procedure in some instances provided results not found through t-test procedures. A summary of the findings related to the hypotheses is presented at the end of the section.

Hypothesis One

There is no significant difference in energy conservation attitudes between selected youths who have and have not been involved in an energy conservation educational program.

The data used to test hypothesis one were obtained from the pretest and posttest change scores as derived from the total scale and the nine subscales denoting attitudes toward energy conservation (Appendix C). A t-test was employed to ascertain whether or not there was a significant difference between the control and the experimental groups relating to change in attitudes of participants toward energy conservation for the total scale and each of the nine subscales. There was no significant differences revealed for the total attitudinal scale.

Two of the nine attitudinal subscales, WILLINGNESS, at the .02 level, and HOMETEMP, at the .05 level were found to be significant (Table 6). After an examination of the mean change scores, the control groups were determined to have had a more favorable attitude change toward WILLINGNESS and HOMETEMP than did the experimental groups who had received instruction in energy education. Based on the results of the analysis, the hypothesis was rejected indicating that there was a significant difference in energy conservation

Table 6

t-Test Values, Mean Change Scores, and Levels of Significance for Subscales Concerning Energy Attitudes and Behaviors

	Control $\bar{X}$	Experimental $\bar{X}$	t	p
Subscales		Attitudes		
AUTOCO	-.06	-.06	-0.13	.89
SACRIFICE	-.07	-.06	-.0.05	.06
SOLAR	-.13	-.07	-0.53	.60
WILLINGNESS	-.21	-.01	-2.41	.02*
GOVTT	-.09	.01	-1.31	.19
NUCLEAR	.12	-.05	1.00	.31
HOMETEMP	-.21	-.01	-1.99	.05*
JOBAV	.08	-.12	1.84	.07
FAVOR	-.02	-.003	-.0.28	.78
Subscales		Behaviors		
AUTOCO	.02	-.04	2.04	.04*
SOLAR	.05	.03	0.50	.62
WILLINGNESS	.04	-.04	2.28	.02*
HOMETEMP	-.08	-.06	-0.50	.61
FAVOR	-.05	-.08	0.52	.60

*Significant at the .05 or beyond level of significance.

attitudes between selected youths who have and have not been involved in an energy conservation educational program for two of the subscales.

Hypothesis Two

There is no significant difference in energy conservation behaviors between selected youths who have and have not been involved in an energy conservation educational program.

The data used to test hypothesis two were the pretest and posttest change scores for behaviors from the second section of the survey obtained from the total behavioral scale and the five subscales (Appendix C). The results from the t-test procedure for the total scale indicated no significant differences. The behavioral subscales, AUTOCO and WILLINGNESS, were significant, however, at the .04 and .02 levels of significance, respectively (Table 6). After reviewing the mean change scores for the data, it was concluded that the experimental groups who had received energy conservation education reported more favorable behaviors for AUTOCO and WILLINGNESS than did the control groups. Data used in the analysis showed that there was a significant difference in energy conservation behaviors between selected youths who had and had not been involved in an energy conservation educational program. Hypothesis two was rejected for two of the behavioral subscales.

Hypothesis Three

There is no significant relationship between energy conservation attitudes and age of selected youths.

The data used to test the third hypothesis were attitudinal scale change scores from the first section of the survey and the ages of youths in the demographic section. A correlation coefficient was computed for age and the total attitudinal scale and for each of the subscales. This correlation coefficient indicated no significant correlation between age and the scale or any of the subscales. The range for the correlation coefficient was -.059 to .056. Based on the data collected from this study, hypothesis three was not rejected. There was no significant relationship between energy-conscious attitudes and ages of selected youths. Hypothesis three was not rejected.

Hypothesis Four

There is no significant relationship between energy conservation behaviors and age of selected youths.

The fourth hypothesis utilized data from the behavioral scale and subscales change scores from the first section of the survey and the youths' age. Utilizing a correlation technique, a significant correlation was revealed between age and the total behavioral scale (p = .02) and two of the subscales, AUTOCO (p = .02) and WILLINGNESS (p = .04). The correlation coefficient was -.140 for total scale, -.139 for AUTOCO, and -.129 for WILLINGNESS. An upward movement of energy consciousness was revealed that was directly

related to age. The older the youth, the more energy conservation behaviors were reported, resulting in a significant relationship between energy conservation behaviors and age of the youths. Thus, hypothesis four was rejected for the total scale and two of the subscales, AUTOCO and WILLINGNESS.

Hypothesis Five

There is no significant relationship between energy conservation attitudes and sex of selected youths.

The data utilized for the fifth hypothesis were attitudinal total scale and subscale change scores on the first section of the survey and the sex of the respondents as indicated in the demographic section. A two-factor analysis of variance (ANOVA) was used to test hypothesis five with groups and sex as the independent variables. There were no significant differences between groups (p = .20) or between sexes (p = .90) for the total scale.

When considering each of nine attitudinal subscales denoting attitude change scores by groups, the data showed a significant difference between the control and experimental groups for two subscales (WILLINGNESS and HOMETEMP) as were indicated by t-test values. These results were the same as the t-test reported in hypothesis one.

A significant (p = .02) difference in sex of the respondents was found for the subscale JOBAV (Table 7). Males ($\bar{X}$ = -.18) were found to have more favorable attitude change scores than did females ($\bar{X}$ = .08). Therefore, based on this data analysis, there was a significant relationship between energy-conscious attitudes and sex

Table 7

ANOVA for Energy Conservation Attitudinal Subscale JOBAV and Sex

Source of Variance	df	SS	MS	F	p
Model	3	7.35	2.45	2.96	.03*
Groups	1	2.97	2.97	3.59	.06
Sex	1	4.51	4.51	5.45	.02*
Groups/Sex	1	0.54	0.54	0.66	.42
Error	269	222.79	0.83		
Corrected Total	272	230.14			

*Significant at the .05 or beyond level of significance.

of selected youths. Hypothesis five was rejected for one of the subscales, JOBAV.

Hypothesis Six

There is no significant relationship between energy conservation behaviors and sex of selected youths.

The data to test hypothesis sex were behavioral scale and subscale change scores from the second section of the survey and the sex of the respondents indicated in the demographic section. The resulting F-ratios with p-values of .06 between control and experimental groups and .90 between males and females were not significant at the predetermined level of significance.

When considering each of the five behavioral subscales separately, significant differences ($p = .05$) appeared between groups

for AUTOCO and WILLINGNESS. These results were consistent with the t-test procedures conducted for hypothesis two. In relationship to the variable sex, analysis of the data from the five subscales indicated that there was no significant relationship. Therefore, when considering behavioral change scale and subscale scores, hypothesis six was not rejected. It was revealed that there was no significant relationship between sex and energy conservation behaviors.

Hypothesis Seven

There is no significant relationship between energy conservation attitudes and geographic location of selected youths.

The ANOVA statistical test was used to determine if there was a relationship between the energy conservation total attitudinal scale and subscales scores and geographic location of selected youths. The results from the two-factor ANOVA showed no significant relationship between groups. When examining the variable geographic location, and the total scale, the data indicated a F-ratio with a p-value of .41 which was not significant.

Data compiled from each of the attitudinal subscales for control and experimental groups indicated that NUCLEAR and JOBAV, with p-values of .03 and .01, respectively, were significantly different (Tables 8 and 9). A more favorable attitude change was indicated by the experimental groups. Neither of these subscales had been found previously to be significant utilizing the t-test procedure, while the other significant subscale, HOMETEMP, had been found to be significant using the earlier t-test analysis.

Table 8

ANOVA for Energy Conservation Attitudinal Subscale NUCLEAR and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	25.19	5.04	2.58	.03*
Groups	1	9.33	9.33	4.77	.03*
Geographic Location	2	6.05	6.05	1.55	.21
Groups/Geographic Location	2	0.53	0.53	0.89	.41
Error	260	508.67	1.96		
Corrected Total	265	533.86			

*Significant at the .05 or beyond level of significance.

Table 9

ANOVA for Energy Conservation Attitudinal Subscale JOBAV and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	8.37	1.67	1.96	.08
Groups	1	5.48	5.48	6.43	.01*
Geographic Location	2	3.34	3.34	1.96	.14
Groups/Geographic Location	2	2.90	2.90	1.70	.18
Error	262	223.45	0.85		
Corrected Total	267	231.82			

*Significant at the .05 or beyond level of significance.

Examination of the five subscales by geographic location (county, towns less than 10,000, and towns and cities greater than 10,000) indicated no significant differences. Based on the data from these analyses, hypothesis seven was not rejected, concluding that no relationship existed between energy-conscious attitudes and geographic location of selected youths.

Hypothesis Eight

There is no significant relationship between energy conservation behaviors and geographic location of selected youths.

The data used to test the eighth hypothesis were the mean change scores from the total behavioral scale and subscales and geographic location. When examining the independent variable groups and the total scale, a significant p-value of .03 showed a favorable behavior change toward energy conservation for the experimental groups (Table 10). This finding was not revealed by the t-test procedure utilized for hypothesis two.

Geographic location was significant at the .003 level of significance for the total behavioral scale. The participants who lived in towns and cities greater than 10,000 showed the most favorable behavioral change scores ($\bar{X} = -.12$), while county residents showed a moderate amount of favorable change ($\bar{X} = -.13$). Participants living in towns less than 10,000 showed the least amount of change toward energy-conscious behaviors ($\bar{X} = .01$).

When the behavioral subscales were examined, the data revealed a significant difference for one subscale (WILLINGNESS) by groups.

Table 10

ANOVA for Energy Conservation Behavioral Scale and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	0.54	0.11	3.22	.01*
Groups	1	0.16	0.16	4.91	.03*
Geographic Location	2	0.41	0.41	6.10	.003*
Groups/Geographic Location	2	0.09	0.09	1.30	.27
Error	261	8.75	0.03		
Corrected Total	266	9.29			

*Significant at the .05 or beyond level of significance.

This finding was similar to that in the t-test analysis for hypothesis two. In addition, significant differences were found for geographic location on four of the five subscales: AUTOCO (p = .05, Table 11), WILLINGNESS (p = .01, Table 12), HOMETEMP (p = .01, Table 13), and FAVOR (p = .02, Table 14). As cited in the behavioral scale analysis, the participants living in towns and cities with a population greater than 10,000 demonstrated the most growth toward energy consciousness (AUTOCO, $\overline{X}$ = -.09, WILLINENESS, $\overline{X}$ = -.05, HOMETEMP, $\overline{X}$ = -.22, FAVOR, $\overline{X}$ = -.21). Towns with population less than 10,000 showed moderate change in HOMETEMP ($\overline{X}$ = -.07) and FAVOR ($\overline{X}$ = -.06), while county residents showed moderate change for AUTOCO ($\overline{X}$ = -.01) and WILLINGNESS ($\overline{X}$ = -.03). The eighth hypothesis was rejected for the total scale and four subscales. There was a

Table 11

ANOVA for Energy Conservation Behavioral Subscale AUTOCO and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	0.53	0.11	1.69	.14
Groups	1	0.10	0.10	1.67	.20
Geographic Location	2	0.38	0.38	3.06	.05*
Groups/Geographic Location	2	0.003	0.003	0.03	.97
Error	261	16.46	0.06		
Corrected Total	266	16.99			

*Significant at the .05 or beyond level of significance.

Table 12

ANOVA for Energy Conservation Behavioral Subscale WILLINGNESS and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	1.28	0.25	2.80	.02*
Groups	1	0.44	0.44	4.83	.03*
Geographic Location	2	0.80	0.80	4.42	.01*
Groups/Geographic Location	2	0.09	0.09	0.47	.62
Error	261	23.79	0.09		
Corrected Total	266	25.07			

*Significant at the .05 or beyond level of significance.

Table 13

ANOVA for Energy Conservation Behavioral Subscale HOMETEMP and Geographic Location

Source of Variance	df	SS	MS	F	p
Model	5	1.32	2.26	2.71	.02*
Groups	1	0.06	0.06	0.61	.43
Geographic Location	2	0.84	0.84	4.32	.01*
Groups/Geographic Location	2	0.44	0.44	2.27	.10
Error	261	25.42	0.10		
Corrected Total	266	26.74			

*Significant at the .05 or beyond level of significance.

Table 14

ANOVA for Energy Conservation Behavioral Subscale FAVOR and Geographic Location

Soruce of Variance	df	SS	MS	F	p
Model	5	1.19	0.24	2.27	.05*
Groups	1	0.24	0.24	2.25	.13
Geographic Location	2	0.87	0.87	4.13	.02*
Groups/Geographic Location	2	0.32	0.32	1.55	.21
Error	258	27.17	0.10		
Corrected Total	263	28.36			

*Significant at the .05 or beyond level of significance.

significant relationship between behaviors and geographic location of selected youths in North Carolina.

Hypothesis Nine

There is no significant relationship between energy conservation attitudes and prior energy conservation experience of selected youths.

The data utilized for examining the three categories for hypothesis nine were obtained from the attitudinal total scale and subscales change scores and from the demographic section. The information solicited from the respondents concerned prior energy conservation experiences defined as number of school courses, participation in a 4-H class, and involvement in an assignment or project related to energy conservation.

School courses. When the data from the control and experimental groups were analyzed, it was found that there was no significant difference for the total attitudinal scale between groups. There was a significant difference between the number of courses taken in school and the total scale (Table 15).

The youths who had experienced no prior courses in school concerning energy conservation ($\overline{X}$ = -.11) showed the most favorable change in attitudes toward energy conservation. The youths who had taken two or more courses ($\overline{X}$ = -.10) in school showed favorable change near that of the participants who had taken no courses in school. The youths with one course ($\overline{X}$ = -.02) showed the least amount of favorable change in total attitudinal scale.

Table 15

ANOVA for Energy Conservation Attitudinal Scale and Prior Energy Experiences (Number of Courses in School)

Source of Variance	df	SS	MS	F	p
Model	5	1.81	0.36	2.49	.03*
Groups	1	0.20	0.20	1.39	.24
School Courses	2	1.08	1.08	3.73	.02*
Groups/School Courses	2	0.44	0.44	1.52	.22
Error	270	39.18	0.15		
Corrected Total	275	40.98			

*Significant at the .05 or beyond level of significance.

When examining the attitudinal subscales, WILLINGNESS and HOMETEMP were found to be significant for groups as earlier indicated by the t-test procedure in hypothesis one. The subscales, WILLINGNESS, NUCLEAR, and FAVOR, in relation to prior energy-related school courses were significant and indicated F-ratios with p-values of .03, .03, and .04, respectively (Tables 16, 17, and 18). These three attitudinal subscales followed no patterns with relationship to number of courses taken in school. For example, WILLINGNESS ($\bar{X}$ = -.28) showed the most favorable attitude change scores after two or more courses; NUCLEAR ($\bar{X}$ = -.23) responded the most favorably after one course; while FAVOR ($\bar{X}$ = -.11) responded most favorably with no course experience.

Table 16

ANOVA for Energy Conservation Attitudinal Subscale WILLINGNESS and Prior Energy Conservation Experiences (Number of Courses in School)

Source of Variance	df	SS	MS	F	p
Model	5	6.59	1.32	2.84	.02*
Groups	1	2.78	2.78	5.97	.01*
School Courses	2	3.41	3.41	3.67	.03*
Groups/School Courses	2	0.36	0.36	0.39	.68
Error	270	125.48	0.46		
Corrected Total	275	132.08			

*Significant at the .05 or beyond level of significance.

Table 17

ANOVA for Energy Conservation Attitudinal Subscale NUCLEAR and Prior Energy Conservation Experiences (Number of Courses in School)

Source of Variance	df	SS	MS	F	p
Model	5	17.75	3.55	1.79	.11
Groups	1	2.27	2.27	1.14	.28
School Courses	2	14.32	14.32	3.60	.03*
Groups/School Courses	2	1.93	1.93	0.48	.62
Error	268	533.07	1.99		
Corrected Total	273	550.82			

*Significant at the .05 or beyond level of significance.

Table 18

ANOVA for Energy Conservation Attitudinal Subscale

FAVOR and Prior Energy Conservation Experiences

(Number of Courses in School)

Source of Variance	df	SS	MS	F	p
Model	5	2.45	0.49	1.72	.13
Groups	1	0.001	0.001	0.000	.95
School Courses	2	1.82	1.82	3.20	.04*
Groups/School Courses	2	0.57	0.57	1.01	.36
Error	270	76.83	0.28		
Corrected Total	275	279.28			

*Significant at the .05 or beyond level of significance.

4-H Class. The scores from the total attitudinal scale indicated F-ratios with p-values of .40 between groups, and .44 for participation in a 4-H class. Thus, these p-values indicated no statistical significance.

A review of the nine subscales revealed a significant difference for WILLINGNESS as cited earlier in relation to hypothesis one. When the variable 4-H class was examined, it was found that AUTOCO was significant at the .003 level (Table 19). The most favorable attitudes for this subscale were revealed for those youths who had no 4-H class ($\bar{X}$ = -.15) when compared to youths who had a 4-H class ($\bar{X}$ = .06).

Assignment or project. The data revealed no significant differences between groups on the energy conservation total attitudinal

Table 19

ANOVA for Energy Conservation Attitudinal Subscale

AUTOCO and Prior Energy Conservation Experiences

(4-H Class)

Source of Variance	df	SS	MS	F	p
Model	3	3.20	1.07	3.48	.02*
Groups	1	0.02	0.02	0.08	.78
4-H Classes	1	2.72	2.72	8.86	.003*
Groups/4-H Classes	1	0.64	0.64	2.10	.15
Error	267	82.01	0.31		
Corrected Total	270	85.22			

*Significant at the .05 or beyond level of significance.

scale (p = .28), nor a significant difference in attitudinal scale score for prior energy conservation education as related to assignment or project (p = .43). However, when reviewing the energy attitudinal subscales by control and experimental groups, responses from the youths were significant for two subscales cited previously (WILLINGNESS and HOMETEMP). Upon examination of the attitudinal subscales by assignment or project related to energy conservation, no significant differences were found.

Based on the analyses of the data, there was a significant relationship between energy conservation behaviors and prior energy conservation experiences. Hypothesis nine was rejected.

Hypothesis Ten

There is no significant relationship between energy conservation behaviors and prior energy conservation experiences of selected youths.

The data used to test the tenth hypothesis were obtained from the behavioral total scale and the subscales change scores from the second section of the energy questionnaire and data from three questions from the demographic section. The questions asked for information concerning prior energy education experience as related to number of school courses, participation in a 4-H class and involvement in an assignment or project related to energy conservation.

School courses. The results of the two-factor ANOVA when comparing behavioral change scores of groups and the total behavioral scale, indicated an F-ratio with a resulting significant p-value at the .05 level of significance, thus, meeting the predetermined level of significance (Table 20). The experimental groups responded more favorably than did the control groups on the behavioral scale as indicated by the t-test procedure in hypothesis two. When examining the total behavioral scale for involvement in school courses, the F-ratio with a p-value (.54) was not significant.

When each of the five behavioral subscales were analyzed, significant differences were found for AUTOCO ($p = .03$) and WILLINGNESS ($p = .02$) by groups. These findings were revealed in the statistical analysis for hypothesis two.

The subscale HOMETEMP was found to be significant with an F-ratio indicating a p-value of .04 for involvement in a school course

Table 20

ANOVA for Energy Conservation Behavioral Scale and Prior Energy Conservation Experiences (Number of Courses in School)

Source of Variance	df	SS	MS	F	p
Model	5	0.32	0.06	1.70	.13
Groups	1	0.14	0.14	3.86	.05*
School Courses	2	0.04	0.04	1.61	.54
Groups/School Courses	2	0.12	0.12	1.59	.20
Error	269	10.15	0.04		
Corrected Total	274	10.47			

*Significant at the .05 or beyond level of significance.

related to energy (Table 21). It was concluded from an examination of the mean behavioral change scores that the most favorable change came from the youths who had two courses in school ($\bar{X}$ = -.12). The least amount of favorable change was seen from the groups who had only one course in energy education in school ($\bar{X}$ = -.01). Thus, for the behavioral subscale HOMETEMP and previous school courses, there was a significant relationship.

4-H class. The findings from the two-way ANOVA when comparing the total scale change scores by groups were not significant (p = .07) at the predetermined level. When testing for a significant difference in scores on the total behavioral scale for involvement in a 4-H class, the analysis of data indicated an F-ratio with a .01 p-value (Table 22). The youths who had not participated in 4-H

Table 21

ANOVA for Energy Conservation Behavioral Subscale HOMETEMP and Prior Energy Conservation Experiences (Number of School Courses)

Sources of Variance	df	SS	MS	F	p
Model	5	0.72	0.14	1.37	.23
Groups	1	0.04	0.04	0.39	.53
School Courses	2	0.68	0.68	3.27	.04*
Groups/School Courses	2	0.02	0.02	0.08	.92
Error	269	28.23	0.10		
Corrected Total	274	28.95			

*Significant at the .05 or beyond level of significance.

Table 22

ANOVA for Energy Conservation Behavioral Scale and Prior Energy Conservation Experiences (4-H Class)

Source of Variance	df	SS	MS	F	p
Model	3	0.38	0.13	3.43	.02*
Groups	1	0.12	0.12	3.20	.07
4-H Class	1	0.26	0.26	7.03	.01*
Groups/4-H Class	1	0.0002	0.0002	0.01	.93
Error	266	9.95	0.04		
Corrected Total	269	10.34			

*Significant at the .05 or beyond level of significance.

energy instruction had the more favorable behavioral change scores ($\overline{X}$ = -.05) while those who had participated indicated a less favorable change score ($\overline{X}$ = .009).

When examining each of the energy behavioral subscales, AUTOCO and WILLINGNESS were again significant by groups, as indicated in hypothesis two. FAVOR was found to be significant at the .01 level for involvement in a 4-H class (Table 23). The findings indicated that participants who had not been involved in 4-H energy education showed a more favorable behavioral change score ($\overline{X}$ = -.11) than those youths who had been involved in 4-H energy classes ($\overline{X}$ = -.003).

Table 23

ANOVA for Energy Conservation Behavioral Subscale FAVOR and Prior Energy Conservation Experiences (4-H Class)

Source of Variance	df	SS	MS	F	p
Model	3	1.10	0.37	3.47	.02*
Groups	1	0.01	0.01	0.07	.79
4-H Class	1	0.72	0.72	6.81	.01*
Groups/4-H Class	1	0.29	0.29	2.70	.10
Error	262	27.82	0.11		
Corrected Total	265	28.93			

*Significant at the .05 or beyond level of significance.

Assignment or project. Although the control group had a more favorable total behavioral scale score than the experimental group, the F-ratio with a p-value of .06 which was not significant at the designated level of significance for groups. The p-value of .41 for energy-conscious behaviors and an energy-related assignment or project was also not significant.

When the behavioral subscales were analyzed, AUTOCO and WILLINGNESS were significant for groups as cited previously from the t-test utilized for hypothesis two. The subscale AUTOCO was found to be significant for energy-conscious behaviors for assignment or project at the .03 level of significance (Table 24). The youths who had not been involved in energy projects or assignments responded with more favorable behavioral changes ($\bar{X} = -.03$), while those youths who had been involved in an energy project or assignment had a less favorable change score ($\bar{X} = .03$).

Based on the analyses of the data, there was a significant relationship between energy conservation behaviors and prior energy conservation experiences of selected youths.

Summary

After reviewing the ten hypotheses formulated for this study, it was concluded that seven of the ten hypotheses were rejected for at least one of the subscales (Table 25). When considering hypotheses one and two which examined energy conservation attitudes and behaviors between selected youths who have and have not been involved in an energy conservation educational program, both the attitudinal

Table 24

ANOVA for Energy Conservation Behavioral Subscale

AUTOCO and Prior Energy Conservation

Experiences (Assignment or Project)

Source of Variance	df	SS	MS	F	p
Model	3	0.61	0.20	3.06	.03*
Groups	1	0.25	0.25	3.72	.05*
Assignment or Project	1	0.31	0.31	4.71	.03*
Groups/Assignment or Project	1	0.002	0.002	0.04	.85
Error	271	17.95	0.07		
Corrected Total	274	18.56			

*Significant at the .05 or beyond level of significance.

Table 25

Results From Hypotheses

Hypothesis	Variable	Status
1	Attitudes; Educational Program	Rejected for Subscales: WILLINGNESS and HOMETEMP
2	Behaviors; Educational Program	Rejected for Subscales: AUTOCO and WILLINGNESS
3	Attitudes; Age	Not Rejected
4	Behaviors; Age	Rejected for Scale and Subscales: AUTOCO and WILLINGNESS
5	Attitudes: Sex	Rejected for Subscale: JOBAV
6	Behaviors: Sex	Not Rejected
7	Attitudes; Geographic Location	Not Rejected
8	Behaviors; Geographic Location	Rejected for Scale and Subscales: AUTOCO, WILLINGNESS, HOMETEMP, and FAVOR
9	Attitudes; Prior Experience	
	School Courses	Rejected for Scale and Subscales: WILLINGNESS, NUCLEAR, and FAVOR
	4-H Class	Rejected for Subscale: AUTOCO
10	Behaviors; Prior Experience	
	School Courses	Rejected Subscale: HOMETEMP
	4-H Class	Rejected for Scale and Subscale: FAVOR
	Assignment or Project	Rejected Subscale: AUTOCO

and behavioral subscales were found to have a significant difference for two subscales. Attitudes and energy education were significantly different for the subscales, WILLINGNESS and HOMETEMP. More favorable attitudes were indicated by the control groups. Conversely, more favorable behaviors were reported for the experimental groups for the two subscales, AUTOCO and WILLINGNESS. Hypotheses one and two were rejected as there was a significant difference in energy conservation attitudes and behaviors between selected youths who have and have not been involved in an energy conservation educational program. Differences were more favorable toward energy consciousness for the control groups for attitudes and more favorable toward energy consciousness for the experimental groups for behaviors.

Analysis of the data concerning the relationship between energy conservation attitudes of selected youths by age failed to reject hypothesis three, concluding that for the youths in this study, there was no significant relationship between energy conservation attitudes and age of selected youths. A significant correlation was revealed between age and the total behavioral scale and two of the subscales, AUTOCO and WILLINGNESS. An upward movement of energy-consciousness was revealed that was directly related to age. The older the youths, the more energy conservation behaviors were reported. There was a significant relationship between energy conservation behaviors and age of the youths. Therefore, hypothesis four was rejected.

Hypotheses five and six examined the relationship between energy conservation attitudes and behaviors and sex of the youths. When

examining both the total scales for attitudes and behaviors, no significant differences were noted by sex. When tested for differences on the attitudinal subscales, a significant difference between sexes was revealed for one subscale, JOBAV. Males were found to have more favorable attitudes toward this subscale than did females. Sex was not revealed as significant for energy conservation behaviors. Thus, hypothesis five was rejected for one subscale, while hypothesis six was not rejected.

Energy conservation attitudes and behaviors were tested for significant differences by geographic location in hypotheses seven and eight. The two-way analysis of variance did not permit rejection of hypothesis seven. Thus, no significant relationship existed between energy-conscious attitudes and geographic location of selected youths. The analysis showed a significant relationship for the behavioral scale and subscales, AUTOCO, WILLINGNESS, HOMETEMP, and FAVOR. The youths who lived in towns and cities greater than 10,000 showed the most favorable behavior changes, while county residents showed a moderate amount of behavior change. Youths who lived in towns and cities less than 10,000 indicated the least amount of change toward energy-conscious behaviors. It appeared from this analysis that geographic location affected energy conservation behaviors.

Hypotheses nine and ten examined energy conservation attitudes and behaviors and prior energy conservation experiences of selected youths. When considering the three categories involving energy instruction--school courses, 4-H class, and assignment or project--

it was revealed that where significant differences were found (WILLINGNESS, NUCLEAR, FAVOR, AUTOCO), in a majority of instances the attitudinal change was more favorable for those youths who had no prior energy conservation experiences. The analysis for behavioral changes indicated significant differences for prior energy experiences (HOMETEMP, FAVOR, and AUTOCO). It appeared that the youths who were involved in two or more courses reported more energy-conscious behaviors, while those youths having one contact with energy education showed less favorable behavior changes than did the youths with no prior energy experiences. Based on the results of the two-way analysis of variance, hypotheses nine and ten were rejected.

Discussion of Findings

The findings and results of this study were based on attitudinal and behavioral change scores. A review of the pretest for both control and experimental groups revealed that over one-half of the youths in both groups expressed favorable energy-conscious attitudes. Less than 25 percent of the youths expressed energy-conservation behaviors. Therefore, many youths were already energy-conscious and had little room for improvement. The fact was revealed particularly pertinent for attitudes.

The fact that attitudes and behaviors were self-reported may also have affected the results of this study. Participants may not always be truthful when responding. The wide age range of the sample (7 to 19 years) may have created problems with reading levels and

information requested. Younger children have limited control over personal and family activities and experiences. Often energy conservation habits and techniques are limited by geographic location and available funds for change of habits and lifestyle.

Although the control groups expressed a more favorable attitude change than did the experimental groups, it may be attributed to the fact that they have had fewer realistic experiences with energy conservation. Youths who have had direct, purposeful experiences in the area of energy conservation may be able to view the situation more clearly.

The results and findings of this research study compared favorably with some youth energy studies, and differed in some aspects with other related studies. Stout (1977), McCampbell (1978), and Kushler and Stevens (1978) found a significant difference by sex of the respondents when viewing energy concepts as was found in this study for one of the subscales, Job Availability (JOBAV). McCampbell (1978) and Kushler and Stevens (1978) found age of the participants to be statistically significant for attitudes and behaviors. Findings from these two studies showed an upward movement of energy-consciousness that was directly related to age. The findings from this study indicated that age was not statistically significant when considering attitudes; however, when examining age and energy conscious behaviors, there was a significant relationship. The older the youth, the more energy conservation behaviors were reported.

The research conducted by Kushler and Stevens (1978), from which the instrument for collecting data for this study was adapted, found

that task-oriented instruction techniques whereby students are directly involved in attempting to save energy and measure the amount of energy saved had a significant positive impact on students' energy conservation attitudes and actions. The findings from this youth energy study revealed a favorable impact for behaviors, but not for attitudes.

Reasons for variations in findings from related youth energy research may be due to the fact that attitudes change slowly (Gray, 1978), and the youths in this study had only a short time (two months) to make energy-conscious changes. The times at which the studies were conducted must also be considered. This study was conducted almost three years after the Kushler and Stevens study cited. Therefore, youths had been exposed to energy conservation strategies through various forms of mass media. Other factors were also evident, such as soaring energy costs and peer and social pressures regarding energy-conscious attitudes and behaviors which may have an effect on these youths.

One point of interest of this study was the dichotomy related to attitudes and behaviors toward energy conservation of selected youths. This concept, strange though it may seem, agreed with research conducted by Lounsbury (1973), Morrison (1975), Wicker (1969), and Zimbardo and Ebbesen (1969) that attitudes were not generalized predictors which were followed by corresponding changes in behaviors.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to examine the attitudes and behaviors of selected youths in Piedmont North Carolina toward energy conservation. The four specific objectives outlined for this study were: (1) to determine attitudes and behaviors of selected youths toward energy conservation; (2) to determine the influence of energy education on the attitudes of selected youths; (3) to determine the influence of energy education on the behaviors of selected youths; and (4) to determine whether or not four variables--age, sex, geographic location, and prior energy conservation experiences--were related to energy conservation attitudes and behaviors.

A pretest-posttest true experimental design was implemented, permitting the comparison of experimental and control groups with pretest and posttest performance. The experimental design applied to both the assessment of energy attitudes and the observable energy consumption outcome behaviors. The target population for this study was defined as youths from ages seven to nineteen years who were members of a 4-H Club affiliated with the North Carolina Agricultural Extension Service, and who resided in one of 29 counties located in the Piedmont region of North Carolina.

Fourteen counties randomly selected from the Piedmont region of North Carolina were utilized in the study. From these counties a stratified cluster sampling procedure was employed to randomly select 28 4-H Clubs (14 rural clubs and 14 urban clubs) meeting the predetermined criteria. Each of the 14 counties contained a randomly selected control and experimental group.

The sample in this study consisted of 284 youths, 127 for the control groups, and 157 from the experimental groups. A review of the demographic data obtained indicated that over two-thirds of the youths were ages ten through thirteen. Sixty percent were female, and the remaining percent male. When considering the geographic location from which a stratified procedure was employed to assure both urban and rural participants, approximately two-thirds of the youths were county residents; the remaining one-third were urban residents. When examining the data for youths concerning prior energy experience, approximately 60 percent had taken energy conservation classes in school, approximately 40 percent had participated in a 4-H energy class, while nearly 38 percent had been involved in an energy related assignment or project.

The North Carolina Youth Energy Survey was utilized as a pre-test-posttest for collecting data from both control and experimental groups. The pretest was administered in October and November, 1980, and the posttest was administered in January, 1981. The experimental groups were provided energy instruction through activities that were designed for a "4-H Energy Fun Day." Special emphasis was placed on involving the youth learners in a variety of direct and purposeful

learning activities and experiences. The control groups received no energy-related instruction.

Conclusions

The analysis of data from this study involved both descriptive statistics and tests of hypotheses. The data collection instrument exhibited a limited range, a five-point continuum for attitudes, and a two-point range for behaviors. Both attitudinal and behavioral scales and subscales were considered.

The responses from the pretests and posttests were tabulated and examined. The attitudinal section of the survey revealed that over one-half of the youths in both the control and experimental groups expressed favorable energy-conscious attitudes. Less than 25 percent of the youths in both groups expressed energy-conservation behaviors.

The hypotheses were tested utilizing *t*-tests, correlation techniques, and two-way analysis of variance. A significant relationship was noted for seven of the ten hypotheses.

When examining the influence of energy education on the attitudes of selected youths, statistical analyses revealed that those youths who had not been involved in energy instruction had a more favorable energy-conscious attitude for two of the attitudinal subscales, Willingness to Make Specific Commitment (WILLINGNESS), and Home Heating and Cooling (HOMETEMP).

Analysis of the influence of energy education on the behaviors of selected youths indicated that those youths who had been

involved in energy conservation had more favorable energy conservation behaviors for the subscales, Automotive Conservation (AUTOCO), and Willingness to Make Specific Commitment (WILLINGNESS), than did the groups who had not been involved in energy instruction.

When considering age of the youths and energy conservation attitudes, the statistical procedures indicated no significant relationships. However, when the relationship between behaviors and age was examined, an upward movement of energy-consciousness was revealed. The older the youths, the more energy conservation behaviors were reported for the total scale and two subscales, Automotive Conservation (AUTOCO), and Willingness to Make Specific Commitment (WILLINGNESS).

There was a statistically significant relationship found between sex and the attitudinal subscale, Job Availability (JOBAV). Males were found to have more favorable attitudes toward this subscale than did females. There was no significant relationship revealed between energy conservation behaviors and sex.

Examination of energy conservation attitudes and geographic location was not found to have a statistically significant relationship. Conversely, the analysis showed a significant relationship for the behavioral scale and four subscales--Automotive Conservation (AUTOCO), Willingness to Make Specific Commitment (WILLINGNESS), Home Heating and Cooling (HOMETEMP), and General Feasibility and Favorability (FAVOR)--by geographic location. The youths who lived in towns and cities of more than 10,000 showed the most favorable behavior changes, while county residents showed a moderate amount of

behavior change. Youths who lived in towns and cities of less than 10,000 indicated the least amount of change toward energy-conscious behaviors.

When considering the three categories--school courses, 4-H class, assignment or project--that comprised energy conservation experiences of selected youths, it was revealed that significant differences were found for four attitudinal subscales. In a majority of instances for the subscales, Willingness to Make Specific Commitment (WILLINGNESS), Nuclear Energy (NUCLEAR), General Feasibility and Favorability (FAVOR), and Automotive Conservation (AUTOCO), it was indicated that the attitudinal change was more favorable for those youths who had no prior energy conservation experiences.

The analysis for behavioral changes indicated statistically significant differences for prior energy experiences for the subscales, Home Heating and Cooling (HOMETEMP), General Feasibility and Favorability (FAVOR), and Automotive Conservation (AUTOCO). It appeared that youths who were involved in two or more courses reported more energy-conscious behaviors, while those youths involved with one contact with energy education showed less favorable behavior changes than did the youths with no prior energy experience.

Energy-conscious actions were exhibited in both the control and experimental groups, but in a different manner. The control groups showed change in attitudes while the experimental groups reported changes in behaviors. The change for the experimental groups toward energy-conscious behaviors may be accredited to the fact that through the "4-H Energy Fun Day" the youths encountered learning experiences

that were direct, purposeful, and provided an opportunity for personal involvement. Since the control groups did not experience these events, the changes were attitudinal not behavioral. An example of this happened with the subscale, Willingness to Make Specific Commitment (WILLINGNESS). This subscale was significant for both attitudes and behaviors. However, the direction was reversed with the control and experimental groups.

When generalizing from this study, two factors should be considered. First, the youths had only a short (two months) period of time for change to take place. Scholars and researchers have documented the fact that attitudes and behaviors change slowly and over a long period of time. Secondly, the data used for this study were attitudinal and behavioral change scores. Many of the youths were already exhibiting favorable energy-conscious attitudes and behaviors as evidenced from the high scores on the pretests. Thus, the youths participating in this study did not have a great deal of room for growth.

An interesting fact was shown involving energy education. Although there was no total predominant pattern, trends indicated that youths were more energy-conscious when there had been either two or more exposures or no energy instruction at all. This fact could be of value to educators, curriculum developers, program evaluators, and others who are working or doing research in the field of energy.

Recommendations for Future Research

There are indications that this study could be replicated utilizing a longer time period for growth on the part of the youth participants. A longer time period between pretest and posttest could give a more accurate picture of the changes in energy-conscious attitudes and behaviors. Another variation of this study might be to consider relationships of other variables such as the amount of prior energy conservation experience of rural versus urban youths. Additional audiences such as parents, adult leaders, and 4-H agents may warrant examination, thus comparing and analyzing possible relationships between these groups and 4-H youth groups.

BIBLIOGRAPHY

Books

Abelson, Philip H., ed. Energy: Use Conservation and Supply. Washington, D.C.: American Association for the Advancement of Science, 1974.

Campbell, William G. and Stephen V. Ballou. Form and Style: Theses, Reports, Term Papers. 5th ed. Boston: Houghton Mifflin Company, 1978.

Cunningham, William H. and Sally Cook Lopreato. Energy Use and Conservation Incentives. New York: Praeger Publishers, 1977.

Freeman, David S., et al. A Time to Choose: America's Energy Future. Cambridge, Massachusetts: Ballinger Publishing Company, 1974.

Gay, L. R. Educational Research: Competencies for Analysis and Application. Columbus, Ohio: Bell and Howell Company, 1976.

Gottlieb, David. "Texans' Responses to President Carter's Energy Proposals." Energy Policy in the United States: Social and Behavioral Dimensions, ed. Seymour Warkov. New York: Praeger Publishers, 1978.

Gunning, Robert. The Technique of Clear Writing. New York: McGraw-Hill Book Company, 1964.

Hammerman, D. R. and W. M. Hammerman, eds. Outdoor Education, A Book of Readings. Minneapolis: Burgess Publishing Company, 1968.

Hammond, Allen L. "Individual Self-Sufficiency in Energy." Energy: Use Conservation and Supply, ed. Philip H. Abelson. Washington, D.C.: American Association for the Advancement of Science, 1974.

Hayes, Denis. Rays of Hope. New York: W. W. Norton and Company, Inc., 1977.

Herman, Glenda M. "Adjusting Our Lives to Stretch Energy." Cutting Energy Costs: 1980 Yearbook of Agriculture, ed. Jack Hayes. Washington, D.C.: U. S. Government Printing Office, 1980.

Hogan, Janice, et al. "A Family Checklist to Conserve Energy." Cutting Energy Costs: 1980 Yearbook of Agriculture, ed. Jack Hayes. Washington, D.C.: U. S. Government Printing Office, 1980.

Kash, Don E., et al. Our Energy Future. Norman, Oklahoma: University of Oklahoma Press, 1976.

Knox, Susan. The Energy Crisis Survival Kit. New York: Strawberry Hill Publishing Company, Inc., 1974.

Landsberg, Hans H. "Low-Cost, Abundant Energy: Paradise Lost?" Energy: Use Conservation and Supply, ed. Philip H. Abelson. Washington, D.C.: American Association for the Advancement of Science, 1974.

Lenski, Gerhardt and Jean Lenski. Human Societies. New York: McGraw-Hill Book Company, 1974.

Lincoln, G. A. "Energy Conservation: Some Challenges Are Proposed for Science and Technology." Energy: Use Conservation and Supply, ed. Philip H. Abelson. Washington, D.C.: American Association for the Advancement of Science, 1974.

Milstein, Jeffrey S. "How Consumers Feel About Energy: Attitudes and Behaviors During the Winter and Spring 1976-77." Energy Policy in the United States: Social and Behavioral Dimensions, ed. Seymour Warkov. New York: Praeger Publishers, 1978.

Olsen, Marvin E. "Public Acceptance of Energy Conservation." Energy Policy in the United States: Social and Behavioral Dimensions, ed. Seymour Warkov. New York: Praeger Publishers, 1978.

Olsen, Marvin E. and Jill A. Goodnight. Social Aspects of Energy Conservation. Seattle, Washington: Battelle Human Affairs Research Center, 1977.

Partin, Mildred B. Surveys, Polls, and Sampling. New York: Harper Publishing Company, 1950.

Purchase, Mary E. "Fifty Ways to Save Your Energy Dollars." Cutting Energy Costs: 1980 Yearbook of Agriculture, ed. Jack Hayes. Washington, D.C.: U.S. Government Printing Office, 1980.

Shomon, Joseph J. Manual of Outdoor Conservation Education. New York: National Audubon Society, 1964.

Swan, James A. and William B. Stapp. Environmental Education: Strategies Toward a More Liveable Future. New York: Sage Publications, Inc., 1974.

Thoreau, Henry David. Walden or Life in the Woods. Boston: Houghton Mifflin Company, 1927.

Warkov, Seymour, ed. Energy Policy in the United States: Social and Behavioral Dimensions. New York: Praeger Publishers, 1978.

Vivian, V. Eugene. Sourcebook for Environmental Education. St. Louis: C. V. Mosby Company, 1973.

Zimbardo, Philip and Ebbe B. Ebbesen. Influencing Attitudes and Changing Behavior. Reading, Massachusetts: Addison-Wesley Publishing Company, 1969.

Government Documents

Clinard, Lil and Nancy Colline. Energy Conservation in the Home. U. S. Department of Energy. Knoxville, Tennessee: University of Tennessee Environment Center and College of Home Economics, 1977.

Dunlop, David L. The Effects of an Energy-Environment Simulator Upon Selected Energy-Related Attitudes of Science Students and In-Service Teachers. U. S., Educational Resources Information Center, ERIC Document ED 164 267, 1978.

Kushler, Martin and William F. Stevens. An Energy Conservation Attitude Questionnaire for Use with High School Students. Energy Extension Service, Michigan Department of Commerce, Lansing, Michigan, Technical Report 3, 1978.

League of Women Voters of the U.S. Energy Conservation Technology Education Program. U.S., Educational Resources Information Center, ERIC Document ED 167 787, 1979.

Leedom, Nancy. A Review of Energy Education Research. Michigan Energy Extension Service, Michigan Department of Commerce, Lansing, Michigan, Technical Report 1, 1978.

Leonard-Barton, Dorothy and Everett M. Rogers. Adoption of Energy Conservation Among California Homeowners. U.S. Educational Resources Information Center, ERIC Document ED 169 598, 1979.

Periodicals

Auchincloss, Kenneth, ed. "Energy: A Program for the '80s." Newsweek, 94 (July 16, 1979), 19-33.

Bisbee, Joyce. "Status of Energy in our Society Today." Consumer Insights Issues, 2 (Spring/Summer, 1974), 1.

Butler, Robert. "A Time for Alarm: An User New Special Editorial." Energy User News, 4 (November, 1979), 1-2.

Canfield, Monte, Jr. and Adam E. Sieminski. "If You're So Smart, Why Ain't You Rich?" Public Administration Review, 35 (July-August, 1975), 322-27.

Christner, Anne M. "The Energy Conservation Crisis." Journal of Home Economics, 71 (Winter, 1979), 32-37.

Coomer, James C. "Solving the Energy Dilemma." The Futurist, 11 (August, 1977), 228-30.

Davidson, Marsha. "Residential Energy Conservation: Homeowners' Attitudes, Existing Housing Features, Actions and Plans." Housing Educators Journal, Proceedings 1977, pp. 110-119.

Dillman, Joye J., Kenneth R. Tremblay, Jr., and Don A. Dillman. "Energy Policies Directed at the Home: Which Ones Will People Accept?" Housing Educators Journal, 4 (May, 1977), 2-13.

Finger, Bill. "A Word From the Editor." NC Insight: North Carolina's Energy Future, 3 (Winter, 1980), 4.

Fogel, Barbara R. "Thinking About Energy." Rockefellow Foundation Illustrated, 4 (April, 1980), 1.

Gallup, George. "No Progress Being Made in Convincing Public of Energy Crisis." Field Newspaper Syndicate, June 7, 1977, 4.

Gore, Rick. "Can We Live Better on Less?" National Geographic, February, 1981, pp. 34-37.

Gottleib, David and Martin Matre. "Conceptions of Energy Shortages and Energy Conserving Behavior." Social Science Quarterly, 57 (May, 1976), 421-29.

Gray, David Dodson. "Social Dimensions of Loss." Forum-Energy: Crisis and Opportunity, Spring/Summer, 1978, p. 15.

Harris, Louis. "Most Now Convinced Energy Shortage Serious." Lubbock-Avalance Journal, February 14, 1977, p. 1.

Henderson, Carter. "Exploring the Future of Home Economics." Journal of Home Economics, 72 (Fall, 1980), 23-26.

Hogan, Janice M. and Beatrice Paolucci. "Energy Conservation: Family Values, Household Practices and Contextual Variables." Home Economics Research Journal, 7 (March, 1979), 210-17.

Jolly, Desmond A. and Kangethe Gitu. "Energy Conservation in Davis, California." Journal of Home Economics, 70 (May, 1978), 37-39.

McCormack, Mike. "The Energy Crisis." Journal of Home Economics, 65 (December, 1973), 7-11.

McKown, Cora. "Housing and Energy: A Lifestyle Decision." Tips and Topics in Home Economics, 20 (Winter, 1980), 1.

McKenna, Judy and Jan Nixon. "Energy Interests: Rural and Urban Differences." Journal of Extension, 17 (September/October, 1979), 15-20.

Montgomery, James. "Housing Technology: How Does it Affect the Energy Crisis?" Journal of Home Economics, 65 (December, 1973), 16-22.

Morrison, Bonnie Maas, et al. "Energy and Families: The Crisis and the Response." Journal of Home Economics, 70 (Winter, 1978), 18-21.

Morrison, Bonnie Maas, and Peter Michael Gladhart. "Energy and Families: The Crisis and the Response." Journal of Home Economics, 68 (January, 1976), 15-18.

Murray, James R. "Evolution of Public Responses to the Energy Crisis." Science, 184 (April, 1974), 257-63.

Odum, Eugene P. "Consumer Sense Ecology." Forum-Energy: Crisis and Opportunity, Spring/Summer, 1978, 8.

Paolucci, Beatrice. "Energy Decisions and Quality Living." Journal of Home Economics, 70 (Winter, 1978), 22-23.

Paolucci, Beatrice and M. Janice Hogan. "The Energy Crisis and the Family." Journal of Home Economics, 65 (December, 1973), 12-15.

Ritchey, S. J. "Energy." Home Economics Research Assessment, Planning and Projections, April, 1978, pp. 61-64.

Rudd, Nancy M. and Molly Longstreth. "Strategies for Energy Conservation." Journal of Home Economics, 70 (May, 1978), 40-3.

Ruffin, Marilyn Doss and Mills B. Weinstein. "Energy in the Farm Home." Home Economics Research Journal, 8 (September, 1979), 2-15.

Smith, Richard B. "Energy Adjustments of Households." Housing Educators Journal, 3 (September, 1976), 29-34.

Till, Gordon Vander. "From the Desk of Gordon Vander Till." Energy 1980, December, 1979, p. 2.

Van Meter, Andy. "Efficiency Comes of Age." Business Today, 17 (Fall, 1979), 19-22.

Ward, Bernie. "Energy and Economics: The Near Term." Sky, February, 1980, pp. 9-16.

Wicker, Allen W. "Attitudes Verses Actions: The Relationship of Verbal and Overt Behavioral Responses to Attitude Objects." Journal of Social Issues, 25 (April, 1969), 41-78.

Unpublished Sources

Bailey, Anne Wiseman. "Socioeconomic Variables and Attitudes of Consumers Related to Energy Conservation Behavior." Ph.D. Dissertation, Ohio State University, 1979.

Carroll, Owen T., Robert Lewis, and Herbert Berger. "Energy: Options for the Future: Conservation." Stony Brook, New York: Institute for Energy Research and State University of New York at Stony Brook, 1978. (Mimeographed.)

Dunnermeyer, Joseph Francis. "Social Status and Attitudinal Predictors of Residential Energy Consumption." Ph.D. Dissertation, University of Kentucky, 1977.

Hall, Timothy Alan. "Energy Conservation: An Analysis of Public Policy Formulation, Implementation, and Alternatives." Ph.D. Dissertation, University of Oklahoma, 1978.

Hoff, William Wayne. "Attitudes Toward the Energy Crisis Among Selected Agricultural Groups." Ph.D. Dissertation, University of Missouri, 1976.

Lopreato, Sally Cook and Marian Wossum Meriwether. "Energy Attitudinal Surveys: Summary, Annotations, Research Recommendations." Austin: University of Texas Center for Energy Studies, 1976. (Mimeographed.)

Lounsbury, John W. "A Community Experiment in Dissemination Models for Citizen Environmental Action." Ph.D. Dissertation, Michigan State University, 1973.

McCampbell, David Howard. "An Investigation of Knowledge Levels of Selected Junior High School Students in Regard to the Field of Energy Cognizance." Ph.D. Dissertation, Texas A & M University, 1978.

McNew, Beverly Martin. "Impact of Energy Costs on Housing Related Decisions of Elderly Householders." Ed.D. Dissertation, Oklahoma State University, 1979.

Morrison, Bonnie Maas. "Socio-Physical Factors Affecting Energy Consumption in Single Family Dwellings: An Empirical Test of a Human Ecosystems Model." Ph.D. Dissertation, Michigan State University, 1975.

Partain, James Douglas. "An Assessment of Energy Cognizance, Attitudes Toward Energy Conservation, and Perceived Conservation Behavior of Selected Public School Educators." Ph.D. Dissertation, Texas A & M University, 1979.

Seasonwein, Roger. "Putting Energy to Work: American Attitudes on Conservation and Government Programs to Encourage More Efficient Energy Use." New York: Union Carbide Corporation, 1980. (Mimeographed.)

Stout, Betty. "Effect of Two Methods of Instruction on Level of Achievement and Attitude of High School Home Economics Students." Ph.D. Dissertation, Iowa State University, 1977.

Thompson, Phyllis T. and John MacTavish. "Energy Problems: Public Beliefs, Attitudes, and Behaviors." Allendale, Michigan: Grand Valley State College, Urban and Environmental Studies Institute, 1976. (Mimeographed.)

White, Lynn K. and Nikolai Rudakov. "Energy: Voluntary Household Conservation in Nebraska." Lincoln, Nebraska: Nebraska Annual Social Indicators Survey, 1979. (Mimeographed.)

APPENDIX A

INSTRUCTIONAL MATERIALS AND STRATEGIES

NORTH CAROLINA STATE UNIVERSITY

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

HOME ECONOMICS
HOUSING AND HOUSE FURNISHINGS
210 RICKS HALL ZIP 27607
TELEPHONE 919-737-3208

September 9, 1980

Dear Selected 4-H Agent:

Accountability and measuring the results of the North Carolina Agricultural Extension Service activities are areas in which much of our organization's emphasis has been placed. However, these data are often difficult to obtain and document. With this goal in mind, a pilot study has been designed (in cooperation with the State 4-H Office, Housing and House Furnishings Department and School of Home Economics, UNC-G) to ascertain data of this type utilizing 4-H clubs in Piedmont North Carolina. The study has been authorized by Dr. Carlton Blalock. From the twenty-nine counties in the piedmont of North Carolina, your county along with fifteen others has been randomly selected to participate in this study.

It has been suggested by administration that adult leaders be utilized to teach the energy units. Therefore, the participation will not be time-consuming on your part. We will be asking that you work with us on the organization structure of setting up cooperating adult leaders from two selected 4-H clubs in your county.

Please fill out the attached form with demographic data of each of the clubs in your county and return as soon as possible, no later than September 19, 1980. As this information is received, we will be contacting you concerning setting up a conference with you and the participating adult leaders to discuss the program in detail.

Note: The learning activities will be centered around "The Energy of the Future" packet of material you received from the State 4-H Office in early July. We will also have an additional copy of the energy packets for each county. Please do not execute the program using these materials until we have contacted you concerning the selection of the two clubs from your county!

Thank you for your cooperation. We shall look forward to hearing from you and visiting with you in the very near future.

Sincerely,

Linda Flowers McCutcheon
Extension Home Furnishings
Specialist

LFMc:ghr

cc: Dr. Carlton Blalock
Mrs. Minnie Brown
Dr. Donald Stormer
Dr. Dalton Proctor
Miss Charlotte Womble

Information on Study

Title: INFLUENCE OF ENERGY CONSERVATION EDUCATION ON ATTITUDES AND BEHAVIORS OF SELECTED YOUTH IN PIEDMONT NORTH CAROLINA

Purpose:

1. To determine attitudes and behaviors of selected youth toward energy conservation.
2. To determine the influence of energy education on the attitudes of selected youth.
3. To determine the influence of energy education on the behaviors of selected youth.
4. To determine if there is a relationship between demographic factors (age, sex, geographic location, prior energy conservation experiences, and conservation behaviors previously undertaken).

Time Frame

2nd Week September:	Agents receive information requesting data on individual 4-H clubs.
3rd Week September:	Data on clubs returned to State Office. Conference call to set up meeting dates and places.
1st and 2nd Week October:	Planning conferences with agents and adult leaders.
3rd Week October:	Adult leaders with experimental* groups will give pretest and teach units, "Your Home Energy Use" and "Alternative Energy Sources." Youth leaders with control** groups will give pretest with no instruction.
4th Week October:	Adult leaders with experiment group clubs will teach units, "Transportation and Energy" and "Change of Habit for Energy."
2nd Week January:	Adult leaders with both experiment and control groups will administer posttest.
1st Week April:	4-H agents and staff will receive findings of study.

*experimental: Receives pretest, instruction, posttest.
**control: Receives only pretest and posttest.

Please complete the following form as accurately as possible and return by September 19, 1980:

County: _____ Name of Agent: _____

Name of Club	Number of Youth on Roster	No. of Years in Existence	Name(s) of Leaders	No of Scheduled Meetings/Year	Urban or Rural*

*Rural--any club with 2/3's of membership living outside the town/city limits.
Urban--any club with 2/3's of membership living within the town/city limits.

NORTH CAROLINA STATE UNIVERSITY

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

HOME ECONOMICS
HOUSING AND HOUSE FURNISHINGS
210 RICKS HALL ZIP 27607
TELEPHONE 919-737-3208

September 23, 1980

MEMO TO: Selected 4-H Agents

FROM: Linda Flowers McCutcheon
Extension Home Furnishings Specialist

SUBJECT: Participation in the Pilot 4-H Energy Program

Thank you for your excellent response and cooperation toward participation in the 4-H energy pilot program. The sample selection process is completed. Attached you will find the list of counties, agents, and clubs included in the sample, for your information.

As per our discussion by phone, we would like to conduct a one-hour training session with you and the adult leader or leaders from the clubs that were selected as the experimental clubs. It will not be necessary for us to meet with the control group leaders, as the instructions are self-explanatory.

I trust you and your experimental club leaders have reviewed your calendars and eliminated those dates in which conflicts might occur. The possible dates for this training, as you know, are September 29, afternoon or evening; September 30, evening; October 1, 2, 6, 7, afternoon or evening, and October 8, 9, 10, afternoon.

As was discussed in our telephone conference, I will be making a conference call Friday morning, September 26 to each of you, except those of you who are in the Northwest district. Since you will be out of your offices and attending the same meeting, Susan Lyday has graciously volunteered to discuss the possible dates with you and set up a convenient time and place.

I shall look forward to meeting with you in the near future. At this meeting you will receive a learning kit which includes instructional materials, visuals, handouts, samples of energy conservation materials, and questionnaires.

If you have questions, please call!

Attachment
kb

NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

HOME ECONOMICS
HOUSING AND HOUSE FURNISHINGS
210 RICKS HALL ZIP 27607
TELEPHONE 919-737-3208

September 30, 1980

MEMO TO: Selected 4-H Agents

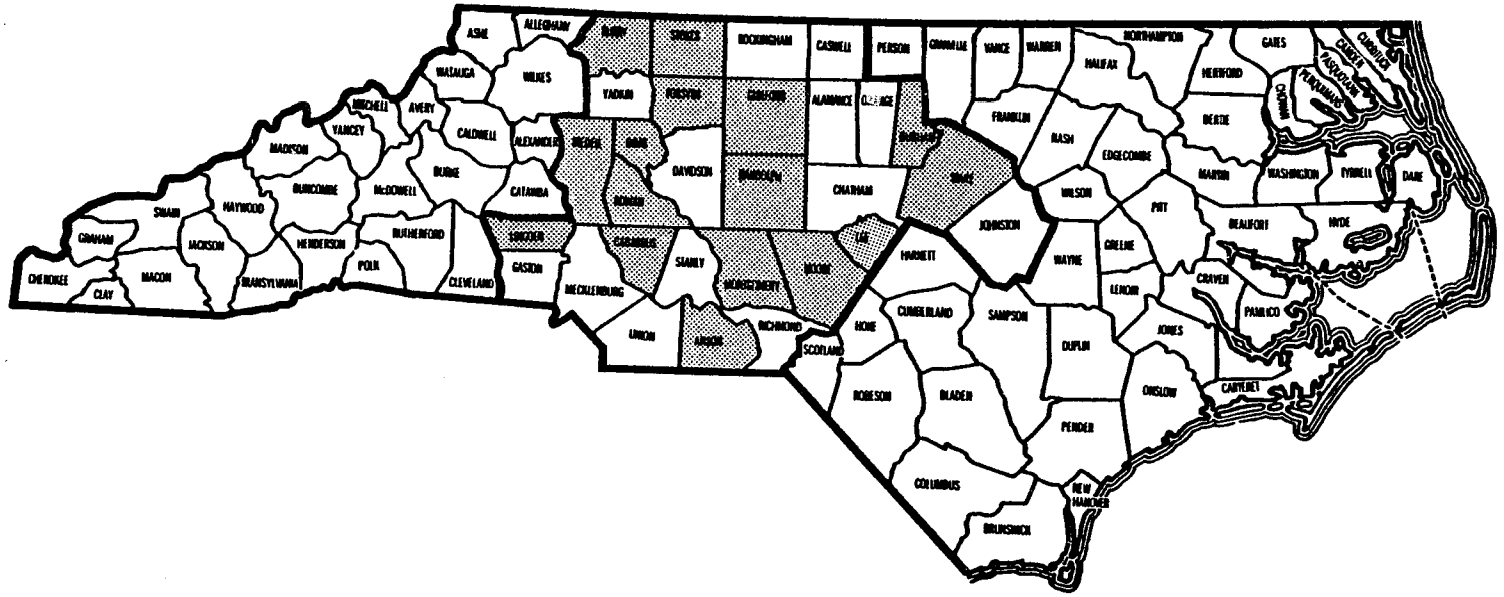
FROM: Linda Flowers McCutcheon
Extension Home Furnishings Specialist

SUBJECT: Selected Clubs, Dates, and Location for Conference with 4-H Agent and Adult Leader(s) for "Experimental" Clubs

Excellent progress is being made toward getting the 4-H Energy Fun Day underway in your county. Attached you will find the demographic data on the clubs selected. Dr. Dalton Proctor and I are looking forward to meeting with you and the leader(s) from the experimental clubs. The following schedule has been arranged.

Lee	Tuesday, September 30, 1:00 p.m. Lee County Office
Durham	Wednesday, October 1, 4:00 p.m. Durham County Office
Wake	Monday, October 6, 7:00 p.m. Wake County Office
Forsyth, Surry Davie, Randolph	Tuesday, October 7, 5:00 p.m. Forsyth County Office
Montgomery, Moore, Anson	Wednesday, October 8, 4:00 p.m. Montgomery County Office
Iredell, Lincoln Rowan	Thursday, October 9, 4:00 p.m. Iredell County Office
Guilford	Friday, October 10, 10:00 a.m. Guilford County Office
Stokes	To be arranged

Please notify if problems occur!


ASHE
ALLEGHANY
WATAUGA
WILKES
AVERY
MITCHELL
YANCEY
MADISON
BUNCOMBE
McDOWELL
BURKE
CALDWELL
ALEXANDER
CATAWBA
SWAIN
HAYWOOD
GRAHAM
JACKSON
MACON
CHEROKEE
CLAY
HENDERSON
TRANSYLVANIA
POLK
RUTHERFORD
CLEVELAND
LINCOLN
GASTON
MECKLENBURG
UNION
CABARRUS
IREDELL
YADKIN
DAVIE
ROWAN
STANLY
ANSON
RICHMOND
SURRY
STOKES
FORSYTH
DAVIDSON
MONTGOMERY
ROCKINGHAM
GUILFORD
RANDOLPH
CASWELL
ALAMANCE
ORANGE
CHATHAM
MOORE
LEE
PERSON
GRANVILLE
VANCE
WARREN
FRANKLIN
JOHNSTON
HARNETT
CUMBERLAND
HOKE
SCOTLAND
ROBESON
SAMPSON
BLADEN
COLUMBUS
BRUNSWICK
NEW HANOVER
PENDER
DUPLIN
WAYNE
GREENE
LENOIR
ONSLOW
JONES
PITT
CRAVEN
PAMLICO
CARTERET
MARTIN
BERTIE
HALIFAX
NORTHAMPTON
GATES
HERFORD
CHOWAN
PERQUIMANS
PASQUOTANK
CAMDEN
CURRITUCK
EDGECOMBE
WASHINGTON
TYRRELL
DARE
NASH
WILSON
BEAUFORT
HYDE

COUNTIES, AGENTS, CLUBS

County	Agent	Clubs
Anson	Anita T. Sikes	Harmony (R/E) Peachland Patriots (R/C)
Davie	Douglas Lee	Eager Beavers (U/E) Davie Academy (R/C)
Durham	Linda H. Washburn	Forestview Heights (U/E) Bragtown Library (U/C)
Forsyth	Susan Lyday	Clemmons (U/E) Cleveland Avenue (U/E)
Guilford	Ellen B. McDonald	N. E. McLeansville (R/E) Deep River (U/C)
Iredell	Linda Briggs	Cool Spring Busy Workers (R/E) Mooreville (U/C)
Lee	Judy Ann Nunn	Good Times (R/E) Getting Together (U/C)
Lincoln	Robin E. Goff	4-H Craft Club (U/E) North Brook Panthers (R/C)
Montgomery	Mildred C. Bruton	Cander Sandspurs (U/E) Eldorado (R/C)
Moore	John M. Pettitt	Pleasant Hill (R/E) Bowlegged Bunch (U/C)
Randolph	Richard W. Peterson	Willing Workers (U/E) Green and Gold (R/C)
Rowan	Ann Mathias	Woodleaf (R/E) St. Pauls (R/C)
Stokes	Susan M. Hilton	Rosebud (R/E) Action (R/C)
Surry	Sara Carolyn Bryson	Lifesavers (R/E) Rippling Water Horse (U/C)
Wake	Stephen P. Walker	Garner Clovers (U/E) Opportunity (R/C)

R denotes Rural E denotes Experimental
U denotes Urban C denotes Control

4-H ENERGY FUN DAY

INSTRUCTION SHEET FOR ADULT LEADERS

PHASE I. (Late October, 1980)

A. Explain activities and events of the energy conservation program (pretest, instruction, and posttest). Special recognition in the form of a Special Merit Certificate will be given each 4-H'er upon completion of posttest.

B. Hand out North Carolina Youth Energy Survey

1. Instructions

The Survey has no right or wrong answers. Select only one answer per question.

2. Procedure

The questionnaire will require 10 to 15 minutes to complete; however, there is no time limit within reason. Ask group to spread out and answer each question individually.

C. Use units "Home Energy" and "Alternative Energy Sources" from Energy Conservation Packet.

D. Assemble and demonstrate solar cooking device during lunch break.

E. Use units "Transportation" and "Change of Habit" from Energy Conservation Learning Packet.

F. Return questionnaire to 4-H agent, who will mail to Raleigh.

PHASE II. (Mid-January, 1981)

A. Hand out questionnaire at the beginning of scheduled meeting. Use the SAME procedure as in PHASE I (B).

B. Return questionnaires to 4-H agent, who will mail to Raleigh.

PHASE III. (Early April)

Results and findings of energy program will be mailed to counties.

4-H ENERGY FUN DAY

LIST OF EQUIPMENT AND SUPPLIES IN LEARNING PACKET

1. The Energy of the Future

   - "Your Home Energy"
   - "Alternative Energy Sources"
   - "Transportation and Energy"
   - "Change of Habit for Energy"

2. Questionnaire

   One set to be used as pretest and another set to be used as posttest.

3. Solar Energy Cooker Kit*

   - Instructions for assembling solar cooker
   - Materials and supplies for solar cooker

4. Weather stripping material

   - Metal weatherstrip
   - Foam weatherstrip

5. Caulking compound

   - Tube
   - Cord

6. Insulation material

   - Walls and Ceiling
   - Hot Water Heater

7. Styrofoam cups

8. Press release

9. Invitation to 4-H'ers

10. 4-H buttons

Also included are questionnaires for "control" group in your county.

*Leader will need to supply hammer and a thermometer.

PRESS RELEASE

A 4-H Energy Fun Day will be participated in by the _____ 4-H Club in _____ County, on October ___, 1980. The group will begin the day's activities by discussing and participating in activities concerning home energy use and exploring alternative energy sources. The group will build a solar cooker and prepare their lunches utilizing solar energy. The afternoon events will include topics on transportation and energy, as well as change of habit for energy conservation. The _____ 4-H Club and their leader(s), _____, were selected along with fourteen other clubs in Piedmont North Carolina to participate in an energy conservation research study sponsored by the North Carolina Agricultural Extension Service and the School of Home Economics, The University of North Carolina at Greensboro. The study began in early October and will conclude in mid-January, 1981. For additional information, contact _____, 4-H Agent, _____ County at _____.

You Are Invited

to Attend

a Special

4-H Energy Fun Day

especially for the_____4-H Club

on_____1980

from_____to_____

Energy Alternative

Solar Cookers

Fun

Hot Dog for Lunch

Hope you can come!!!

A SUN-POWERED HOT DOG COOKER

Things You Need:
- A piece of 1" x 8" lumber, 4' long
- A piece of sheet aluminum 1' wide by 2' long (thing-gauge aluminum, from a hardware store)
- Two 4" long nails, and a handful of short nails
- Two wood screws, 2" long
- Two metal washers that fit on the screws
- A pad of steel wool
- Tube of household cement
- Aluminum foil
- Brown wrapping paper
- A pencil
- Yardstick or ruler
- Wood saw
- Tin snips

Instructions:

Draw a grid of 1" squares on the piece of wrapping paper--it should look like a big version of the grid sketched here. The grid should contain a total of 100 squares and should measure 10" x 10".

Carefully draw the pattern shown on the grid here on your larger grid. Carefully cut out the pattern.

Lay the pattern down on your piece of wood (place it next to one end of the board), then trace it with your pencil. Now make a second one just like the first.

Use a wood saw to cut out the two side pieces. Then, cut a 12¼" piece of wood for the "base" and two 8¼" pieces of wood for the "side supports." (See sketch for details.)

Here's the tricky part: Nail the piece of aluminum to the two "side panels" to make a kind of aluminum-bottomed "canoe." Cut off the excess metal with tin snips.

Use the steel wool pad to polish the inner aluminum surface, then wipe away the bits of dirt and metal. Apply a layer of household cement to the metal surface, and carefully cover the cement

with a piece of aluminum foil cut to fit inside the "canoe." (The shiny side of the foil must face outwards, towards you.)

Drill one hole in the center of the upper portion of each side panel, as shown in the sketch. The diameters of these holds should be very slightly less than the diameters of your long nails.

Push the long nails into the holes, and secure them with a dab or two of cement. Clean the nails by polishing them with steel wool, then rinsing with water.

Nail the "base" and "side supports" together. Next, drill a hole near the top of each "side support." Use the wood screws (and washers) to mount the "canoe" on the support stand.

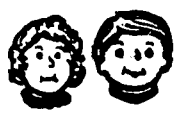
Using your cooker is a snap! Just skewer a hot dog on the two long nails, and point the cooker towards the sun. It takes a few minutes of strong sunlight to prepare the hot dog.

One final point: The nails will get hot! Use a fork to remove the cooked hot dog.

FAMILY ENERGY SAVER CONTEST

WHO WAS THE ENERGY SAVER IN THE FAMILY THIS PAST WEEK? CHECK THE THINGS FAMILY MEMBERS HAVE DONE TO SAVE ENERGY AND TOTAL THE POINTS.

CHILD



Turned off lights when leaving the room. ___

Turned off T.V. set when leaving the room. ___

Took brief shower instead of bath. ___

Dried hair with a towel rather than a hair dryer. ___

Ate fresh fruits for snack instead of junk snack food. ___

Reused a container, box or bottle for use as a toy. ___

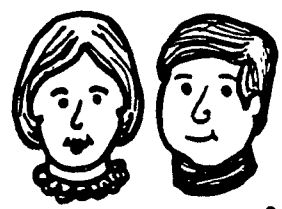
Promptly shut refrigerator and/ or freezer door. ___

Read a book or played outside instead of watching T.V. ___

Read about energy conservation or alternative energy. ___

Did family errands by walking or taking a bike. ___

ADULT



Kept the hot water turned down to 140° or less. 110° without a dishwasher. ___

Carpooled, biked, or took the bus this week for one or more trips. ___

Used cold or warm water for at least a portion of family washing. ___

Took a brief shower instead of a bath. ___

Dried hair with a towel rather than a hair dryer. ___

Purchased in season fresh vegetables rather than processed (canned or frozen). ___

Reused paper sacks, boxes, clothes or recycled paper and glass. ___

Grouped family shopping activities to reduce the number of trips. ___

Bought products in recyclable containers rather than throwaway. ___

Stayed within the 55 mile per hour speed limit. ___

SCORING: ADD UP 1 POINT FOR EACH ACTIVITY THAT PARENT OR CHILD DID TO CONSERVE ENERGY DURING THE PAST WEEK.

SCORE 10: Congratulations on your energy saving efforts!

SCORE 8-9: A little more effort will help you save money and energy.

SCORE 6-7: You need to take energy saving more seriously if you want enough energy around for you and your children 20 years from now.

SCORES OF 5 OR LESS: Although this activity is not really a contest where there are winners or losers, you should really consider taking simple steps to save energy and money. Voluntary energy conservation now may avoid mandatory conservation in the future.

AN ENERGY ETHIC

OBJECTIVE: TO ENCOURAGE AN ENERGY CONSERVING ETHIC FOR STUDENTS

Below you will see a list of items and activities which require energy for their manufacture, use, and disposal. Number (rank) these items in order of importance and necessity to you. Mark your responses in column A--number 1 being most important on down to number 20 for least important.

A	B	C
___ watching television	___	___
___ hot water for bathing	___	___
___ electric toothbrush	___	___
___ waffle iron	___	___
___ synthetic clothing	___	___
___ reading a book	___	___
___ eating a raw apple	___	___
___ TV dinners	___	___
___ car ride to the store	___	___
___ drive-in movie	___	___
___ making homemade ice cream	___	___
___ lipstick or cologne	___	___
___ aerosol deodorant	___	___
___ electric hairdryer	___	___
___ bike riding	___	___
___ a walk in the sun	___	___
___ candy	___	___
___ nighttime football games	___	___
___ hot lunches	___	___
___ school buses	___	___

Now that you have ranked these items according to their importance to you, go back and rank the ones you feel are *most energy intensive* in Column B (from "1 to "10".) Discuss your answers in group.

Now mark in Column C the items you could do without which would help you and our nation conserve energy. Discuss your answers.

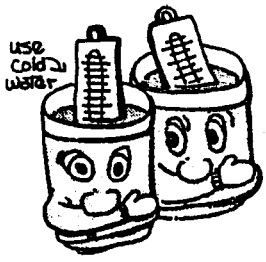
Suggestions:

1. Develop an Energy Alternatives bulletin board for the school or meeting place.

HOW MUCH WARMER DO THINGS GET IN THE SUN THAN IN THE SHADE ?

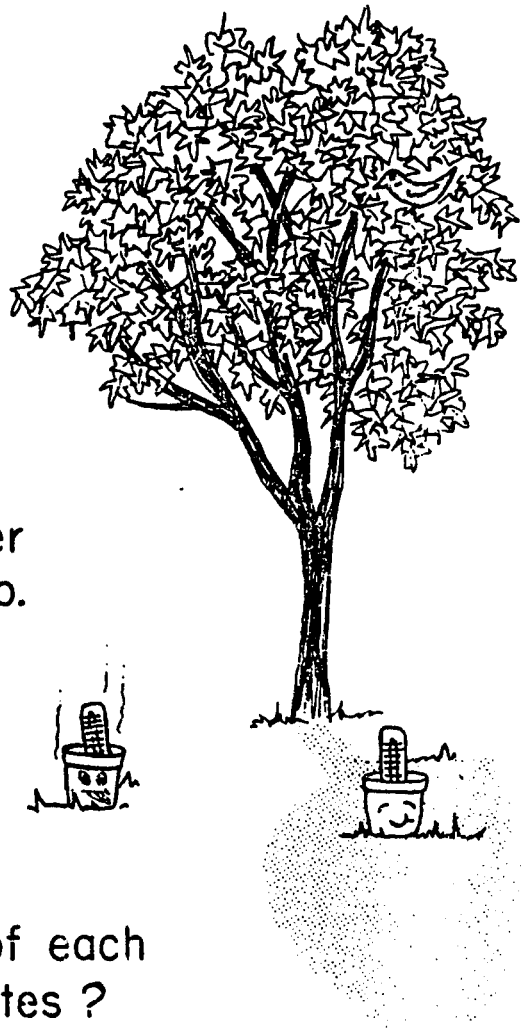
MATERIALS:
- 2 Styrofoam cups
- 2 Thermometers
- Watch

Pour equal amounts of cold water into 2 styrofoam cups. (the colder the better!)



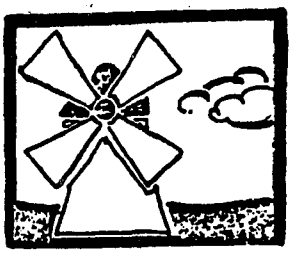
Place a thermometer in each cup.

Set one in the sun and the other in the shade.

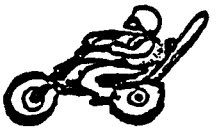


What is the temperature of each after 5, 10 and 15 minutes ?

ENERGY MATCH



1st BELOW ARE SOME PICTURES OF THINGS THAT USE ENERGY. FOR EACH PICTURE THERE IS A MATCHING PICTURE. THE MATCHING PICTURE DOES THE SAME THING BUT USES A DIFFERENT KIND OF ENERGY. CAN YOU FIND THE MATCHING PICTURES? DRAW A LINE AND CONNECT THEM.



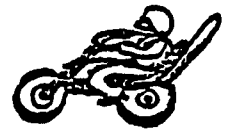
2nd NOW THAT THE PICTURES ARE MATCHED, WHICH PICTURE IN EACH MATCH USES LESS ENERGY. DRAW A CIRCLE AROUND THE PICTURE THAT YOU THINK USES LESS ENERGY. DO YOU KNOW WHY IT USES LESS ENERGY?

ANSWERS

A SAILBOAT USES WIND ENERGY; WHEREAS, A MOTORBOAT USES GASOLINE.

A TOOTHBRUSH USES YOUR OWN ENERGY; WHEREAS, AN ELECTRIC TOOTHBRUSH USES ELECTRICITY.

A CLOTHESLINE USES THE SUN'S ENERGY; WHEREAS, A CLOTHES DRYER CAN USE EITHER NATURAL GAS OR ELECTRICITY.



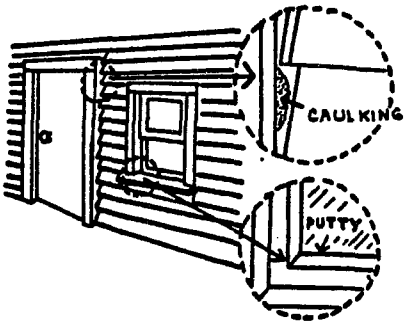
A BICYCLE USES YOUR OWN ENERGY WHEREAS, A MOTORCYCLE NEEDS GASOLINE.

READING USES YOUR OWN ENERGY; WHEREAS, TELEVISION NEEDS ELECTRICITY TO MAKE IT WORK

INVESTIGATION

OBJECTIVE: TO DETERMINE HOW MUCH, IF ANY, ADDITIONAL WEATHERPROOFING NEEDS TO BE ADDED TO YOUR HOME.

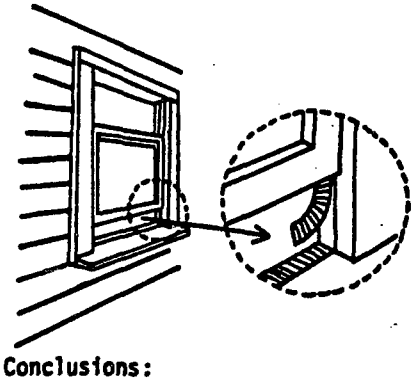
To reduce the heating and cooling costs in a home, it is important to reduce air movement in or out of the home. The cheapest, most effective way to reduce infiltration is with weatherproofing: caulking, putty, or weatherstrips. Below you will see illustrations of several locations where infiltration is likely to occur. Refer to the illustrations and use the checklist to determine the condition or existence of weatherproofing at your house.



1. WINDOWS

Check the circled areas of your windows.

- ☐ OKAY - Good, unbroken weatherstripping in all places with no drafts.
- ☐ FAIR - Weatherstripping damaged or missing in some places and minor drafts.
- ☐ POOR - No weatherstripping at all and very drafty.

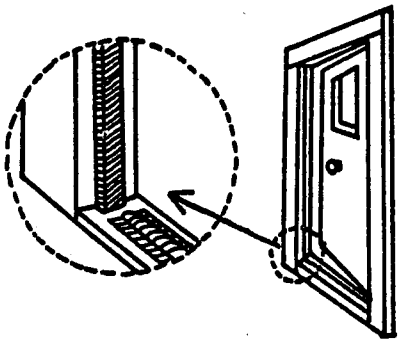


2. DOORS

Check the circled parts of the door.

- ☐ OKAY - Good, unbroken weatherstripping with no drafts.
- ☐ FAIR - Weatherstripping is missing or damaged in places with minor drafts.
- ☐ POOR - No weatherstripping and very drafty.

Conclusions:



3. AREA AROUND THE DOORS AND WINDOWS

Look at a typical door and window area and check the circled areas carefully.

- ☐ OKAY - Caulking fills all cracks around the door frame and the putty around the window is unbroken and solid; no drafts.
- ☐ FAIR - Putty and caulking are cracked or missing, causing minor drafts
- ☐ POOR - No caulking at all and the putty is in very poor condition causing very bad drafts.

Conclusions:

If you checked fair or poor for any of the three areas, then the weatherstripping, caulking, or putty needs to be replaced. If all areas are okay, then you don't need caulking, weatherstripping, or putty.

Activity - HOME ENERGY SEARCH

Materials Needed: Home Energy Search Sheet
Easel Paper
Felt Pen

Procedure:
1. A large copy of the Energy Search Home is drawn on the easel paper.
2. The 4-Her's should be divided into groups. Each group will discuss energy use in a different room listed in the house.
3. The groups should report back what kinds of energy are commonly used in each room. Each of these uses is filled in on the large copy of the Energy Search House on the easel.
4. The discussion should include any other uses that they can add to the list.

Discussion of the Main Idea:
1. The idea that each room of the house uses energy should be stressed.
2. What kind of energy is being used in each case? The 4-H group should be told that in the United States the breakdown of family energy use is:
   Transportation 42%
   Heating & Cooling 40%
   The most common uses in the home are:
   1st - Heating and cooling
   2nd - Hot water
   3rd - Refrigerator
3. Were you surprised at all the energy uses in the home?

Computing Miles Per Gallon

Miles per gallon is the number of miles you get from one gallon of gasoline. Basically, it is an indication of the fuel efficiency of your car.

To compute miles per gallon, you must keep a record of the amount of gasoline added to your tank and the odometer reading at each fill-up. Miles per gallon (MPG) is obtained by dividing the miles traveled since the previous fill-up by the gallons added to the last fill-up. (In other words, you divide the number of miles driven between fill-ups by the number of gallons of gasoline used.) Keeping track of miles per gallon is one way to detect the need for a tune-up when your mileage drops.

Study the example below:

First Saturday odometer reads	15,550
Second Saturday odometer reads	15,800
How many miles were traveled?	15,800
	-15,550
	250 miles

Note: The rightmost dial of your odometer indicates tenths of a mile and can be disregarded for this project.

Miles traveled 250

Gallons of gas used 10

Miles per gallon = 250 ÷ 10 = 25 MPG

NORTH CAROLINA STATE UNIVERSITY

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

HOME ECONOMICS
HOUSING AND HOUSE FURNISHINGS
210 RICKS HALL ZIP 27607
TELEPHONE 919-737-3208

December 26, 1980

Dear Selected 4-H Agent:

Thanks for your excellent cooperation concerning the "4-H Energy Activities." The project is going great. Presently we have 176 4-H'ers in the experimental group and 155 in the control group.

Attached are the posttests, list of 4-H'ers names, recognition certificates, and instructions for volunteer adult leaders. Please see that the posttests and instructions are delivered to each leader as early as possible in January, as the questionnaires should be completed during the regularly scheduled meeting in January. The leaders are encouraged to check the list of names of 4-H'ers and make all efforts possible to have each 4-H'er who participated in the pretest and energy activities to complete the posttest.

When the posttests are completed, please keep them in your office. I will come to your county and pick them up the last week in January or the first week in February. I shall be talking with you by phone before that time.

I trust that you have had an enjoyable holiday. I shall look forward to visiting with you soon.

Sincerely,

Linda Flowers McCutcheon
Extension Home Furnishings Specialist

LFMc:klb

Attachments

THE
NORTH CAROLINA
AGRICULTURAL EXTENSION SERVICE

Expresses Appreciation to

_____

for
Participation in the 4-H Energy Research Program.

Energy Program Coordinator

Associate State 4-H Leader

Energy Program Advisor

January 1, 1981
Date

State 4-H Leader

4-H Energy Research Program

Instructions for Adult Leaders

January Meeting

1. Contact by phone each of the 4-H'ers whose name appears on the attached list. (These are the names of 4-H'ers who have completed the pretest and energy activities from your club.) Tell the youth that the January meeting will be the final part of the energy research program and that they will need to complete a list of questions and will receive a recognition certificate for their participation. (If they cannot attend the meeting, suggest other mutually convenient times that the questionnaire might be completed.) Please make every effort to have each youth who participated in the pretest and energy activities to complete the posttest. It will be fine to have him/her answer the questionnaire in another setting (home, church, etc.) as it is necessary to reach the same 4-H'ers.

2. Give each 4-H'er a questionnaire at the beginning of the January meeting. Ask the group to spread out and answer each question independently. (Generally, follow the same instructions as with the pretest.)

3. Ask each 4-H'er to place the same three initials on the posttest as they placed on the pretest, and complete ALL four pages.

4. When the questionnaires are completed and returned to you, CHECK EACH ONE CAREFULLY TO SEE THAT INITIALS ARE PLACED ON THE FRONT PAGE, TOP RIGHT-HAND CORNER, AND THAT ALL PAGES AND QUESTIONS ARE COMPLETE. (It is essential that each questionnaire be totally complete, otherwise, it will be deleted from the study.

5. As each 4-H'er totally completes the questionnaire, award him/her the recognition certificate.

6. Return questionnaires to your 4-H agent as soon as possible. They will be picked up from the Extension Office in late January and prepared for data processing and analysis.

7. A copy of the results and findings from the 4-H energy research program, "Influences of Energy Education of Selected Youth in Piedmont North Carolina" will be mailed to you in the early spring!

8. Thank you for your excellent cooperation. You will also find a certificate of recognition for your participation. If there are questions or problems, please call your 4-H Agent or Linda McCutcheon (collect) 919-737-2770.

NORTH CAROLINA STATE UNIVERSITY

SCHOOL OF AGRICULTURE AND LIFE SCIENCES

HOME ECONOMICS
HOUSING AND HOUSE FURNISHINGS
210 RICKS HALL ZIP 27607
TELEPHONE 919-737-3208

February 13, 1981

Dear Selected 4-H Agent:

The 4-H Energy Surveys look most interesting. I am pleased to report that the posttest return percentages (experimental, 89% and control, 82%) are high. Thus, there were 157 posttests returned in the experimental groups, and 127 posttests received in the control groups.

The results and findings will be mailed to you in early April. In addition to the abstract, a mini-slide presentation will be available on loan for you to share with your adult leaders and participating 4-H groups (or others). A number of agents have shared slides and newspaper articles with me already; if you have others or those I have not seen, please mail them to me as soon as possible so that they may be included in the slide program.

Many of you mentioned that other 4-H groups in your county had expressed an interest in the "4-H Energy Fun Day." Please let me know if I may be of assistance in implementing these additional programs. Thanks again for your interest, participation, and a job well done!

Sincerely,

Linda Flowers McCutcheon
Extension Home Furnishings Specialist

LFMc: kb

cc: Dr. T. C. Blalock
Dr. Don Stormer
Dr. Martha Johnson
Dr. Dalton Proctor

APPENDIX B

INSTRUMENT

PLEASE PLACE INITIALS __ __ __

NORTH CAROLINA YOUTH ENERGY SURVEY

Please Circle Your Choice of Answers

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
Example: It is more fun to be outside on a cool day than a hot day.	(SA)	A	U	D	SD
1. New ways to save energy should not be looked for if my family's taxes have to be increased to pay for them.	SA	A	U	D	SD
2. I would ride my bike or walk rather than ride in a car if it helped save energy.	SA	A	U	D	SD
3. I am willing to change the way I live to save energy.	SA	A	U	D	SD
4. I am willing to go to sports events right after school (instead of at night) to save lighting energy.	SA	A	U	D	SD
5. Energy conservation is one of the most important goals of my age group.	SA	A	U	D	SD
6. I am willing to spend 4 hours caulking the windows in my home.	SA	A	U	D	SD
7. I would like my family to keep the thermostat below 70^{o} in our house in the winter.	SA	A	U	D	SD
8. The best way for me to deal with today's energy shortage is to forget it and let the scientists worry about it.	SA	A	U	D	SD

		STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
9.	Saving energy will cause people to lost jobs.	SA	A	U	D	SD
10.	I would like my parents to buy solar collectors for the roof of our home.	SA	A	U	D	SD
11.	The North Carolina State Government should put saving energy high on its list of important things to do.	SA	A	U	D	SD
12.	I would like my parents to insulate or otherwise reduce our home heating.	SA	A	U	D	SD
13.	We can decrease our need to build more power plants by asking people to save energy.	SA	A	U	D	SD
14.	The effort made by individuals to save energy can have a major effect on our energy problem.	SA	A	U	D	SD
15.	The government should spend a larger portion of their present budget on energy conservation.	SA	A	U	D	SD
16.	I would not really change the way I do things just to help save energy.	SA	A	U	D	SD
17.	I would like my family to reduce their use of electricity.	SA	A	U	D	SD
18.	If I could, I would buy a fast car with a big engine rather than a slower, small engine car.	SA	A	U	D	SD
19.	I am willing to share a car with two or more other people when going home from school to save energy.	SA	A	U	D	SD

		STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
20.	I am willing to go once a week to a neighborhood energy conservation group meeting.	SA	A	U	D	SD
21.	I would like my parents to buy a car that gets better gas mileage the next time they buy a car.	SA	A	U	D	SD
22.	I am willing to drive 55 mph or slower to save gasoline.	SA	A	U	D	SD
23.	Solving energy problems through saving energy will cost less than building new power plants.	SA	A	U	D	SD
24.	I am willing to help my family build a solar water heater	SA	A	U	D	SD
25.	I am willing to spend 4 hours helping my family better insulate our home.	SA	A	U	D	SD
26.	If it meant extra work for me, I would not favor new laws being passed to help save energy.	SA	A	U	D	SD
27.	Government should use taxes to increase energy conservation.	SA	A	U	D	SD
28.	I should not be expected to help pay the cost of finding new ways to save energy.	SA	A	U	D	SD
29.	Cars should be taxed by miles per gallon rather than the weight of the car.	SA	A	U	D	SD
30.	I would like to spend 4 hours doing volunteer work on energy conservation.	SA	A	U	D	SD

		STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
31.	I would like to help build a solar collector on the roof of our home.	SA	A	U	D	SD
32.	I am willing to ride a bus to recreational events.	SA	A	U	D	SD
33.	My efforts can help solve the energy problem.	SA	A	U	D	SD
34.	I would like to help build a windmill to help provide energy for our home.	SA	A	U	D	SD
35.	Property taxes should be higher for the homes of people that use larger amounts of energy.	SA	A	U	D	SD
36.	Government should provide tax-free loans to help people insulate their homes.	SA	A	U	D	SD
37.	I would like it if my parents would carpool with neighbors.	SA	A	U	D	SD
38.	I am willing to take cooler showers or baths to save energy.	SA	A	U	D	SD
39.	Saving our limited supply of energy should be thought of as one of our nation's most important problems.	SA	A	U	D	SD
40.	I am willing to spend 4 hours helping other people make their homes more energy efficient.	SA	A	U	D	SD
41.	The federal government should put energy conservation high on its list of important things to do.	SA	A	U	D	SD

		STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
42.	I would like my family members to drive less and walk or ride a bike more.	SA	A	U	D	SD
43.	I would favor using as much energy as needed for me to be comfortable and not worry about future needs.	SA	A	U	D	SD
44.	I don't worry about conserving energy because new methods and ideas will solve the energy problem.	SA	A	U	D	SD
45.	I favor the increased use of nuclear power.	SA	A	U	D	SD
46.	Energy conservation will produce new jobs.	SA	A	U	D	SD

Please indicate whether or not any of the tasks listed below have been completed in the past <u>two months.</u>

<u>Please circle your choice of answers</u>

IN THE LAST TWO MONTHS, HAS YOUR FAMILY	47.	Added three inches or more of insulation to your home.	YES	NO
	48.	Caulked or weatherstripped your home's doors or windows.	YES	NO
	49.	Lowered the thermostat by three degrees or more.	YES	NO

IN THE LAST TWO MONTHS, HAS YOUR FAMILY	50.	Traded in a large car for a smaller one?	YES	NO
	51.	Installed a solar collector?	YES	NO
	52.	Carpooled ten times or more?	YES	NO
	53.	Put blankets or plastic over windows to save heat?	YES	NO
	54.	Installed a wood-burning heater or wood-burning stove?	YES	NO

IN THE LAST TWO MONTHS, HAVE YOU	55.	Asked your parents to do any of the above tasks?	YES	NO
	56.	Helped someone insulate, caulk, or weatherstrip a home (including your own)?	YES	NO
	57.	Talked to your parents about the need to conserve energy?	YES	NO
	58.	Chosen at least 5 times to walk or ride bus to school instead of riding in a car?	YES	NO
	59.	Turned off lights to save electricity more than 10 times?	YES	NO
	60.	Figured your family's gas mileage?	YES	NO
	61.	Taken a cooler or shorter shower to save hot water?	YES	NO
	62.	Ridden a public bus (not a school bus) over 3 times?	YES	NO
	63.	Tried to save gasoline by driving or riding in a car less?	YES	NO
	64.	Saved energy in any other way?	YES	NO

If you answered "yes" to question 64, please describe below what else you did to conserve energy. (WRITE ONLY IN THE SPACE BELOW.)

(This page utilized only in pretest.)

Please circle your choice of answers

Example:	What is the current year:	1979	(1980)	1981
65.	What is your age?	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19		
66.	What is your sex?	Female	Male	
67.	Where do you live?	County	Town Under 10,000	Towns and Cities Over 10,000
68.	In how many courses in school have you studies about energy conservation?	0	1	2 or More
69.	Has the 4-H agent or leader taught energy conservation in your class?	YES	NO	
70.	Have you ever been given an assignment or project to save energy in your home or car?	YES	NO	

CONSENT FORM

I understand the purpose of the two questionnaires on energy conservation. I am willing to participate in the program.

_____

Signature

APPENDIX C

ATTITUDINAL AND BEHAVIORAL SCALES

NORTH CAROLINA ENERGY YOUTH SURVEY

ATTITUDINAL AND BEHAVIORAL SCALES

NORTH CAROLINA ENERGY YOUTH SURVEY

Attitudinal Scale

Subscale 1 - Automotive Conservation (AUTOCO)

The subscale contained nine statements and was intended to measure the youth's willingness to use a car less to save energy and the youth's expressed desire for parents to do the same.

Items:
2. I would ride my bike or walk rather than ride in a car if it helped save energy.
18. If I could, I would buy a fast car with a big engine rather than a slower, small engine car.
19. I am willing to share a car with two or more other people when going home from school to save energy.
21. I would like my parents to buy a car that gets better gas mileage the next time they buy a car.
22. I am willing to drive 55 mph or slower to save gasoline.
29. Cars should be taxed by miles per gallon rather than the weight of the car.
32. I am willing to ride a bus to recreational events.
37. I would like it if my parents would carpool with neighbors.
42. I would like my family members to drive less and walk or ride a bike more.

Subscale 2 - Lack of Personal Responsibility, Sacrifice (SACRIFICE)

The subscale contained seven items and expressed the degree to which the youth felt he should not have to take responsibility nor make sacrifices to conserve energy.

Items: 1. New ways to save energy should not be looked for if my family's taxes have to be increased to pay for them.

8. The best way for me to deal with today's energy shortage is to forget it and let the scientists worry about it.

16. I would not really change the way I do things just to help save energy.

26. If it meant extra work for me, I would not favor new laws being passed to help save energy.

28. I should not be expected to help pay the cost of finding new ways to save energy.

43. I would favor using as much energy as needed for me to be comfortable and not worry about future needs.

44. I don't worry about conserving energy because new methods and ideas will solve the energy problem.

Subscale 3 - Solar Energy (SOLAR)

This measure contains three items and measures the youth's attitude toward using solar energy.

Items: 10. I would like my parents to buy solar collectors for the roof of our home.

24. I am willing to help my family build a solar water heater.

31. I would like to help build a solar collector on the roof of our home.

Subscale 4 - Willingness to Make Specific Commitment (WILLINGNESS)

This subscale contained six items and stated youth's willingness to devote personal time to work in energy conservation activities.

Items: 6. I am willing to spend four hours caulking the windows in my home.

20. I am willing to go once a week to a neighborhood energy conservation group meeting.

25. I am willing to spend four hours helping my family better insulate our home.

30. I would like to spend four hours doing volunteer work on energy conservation.

34. I would like to help build a windmill to help provide energy for our home.

40. I am willing to spend four hours helping other people make their homes more energy efficient.

Subscale 5 - Government and Taxes (GOVTT)

This subscale indicated the degree the youth believed that government should prioritize energy conservation and that taxes should be used to promote energy conservation. This scale contained seven items.

Items: 11. The North Carolina State government should put saving energy high on its list of important things to do.

15. The government should spend a larger portion of their present budget on energy conservation.

27. Government should use taxes to increase energy conservation.

35. Property taxes should be higher for the homes of people that use larger amounts of energy.

36. Government should provide tax-free loans to help people insulate their homes.

39. Saving our limited supply of energy should be thought of as one of our nation's most important problems.

41. The federal government should put energy conservation high on its list of important things to do.

Subscale 6 - Nuclear Energy (NUCLEAR)

This subscale measured the youth's attitude toward the use of nuclear energy and contained one statement.

Item: 45. I favor the increased use of nuclear power.

Subscale 7 - Home Heating and Cooling (HOMETEMP)

The topic indicated the youth's willingness to reduce the use of air conditioning in the summer and heat in the winter to save energy. The subscale consisted of two items.

Items: 7. I would like my family to keep the thermostat below 70° in our house in the winter.

12. I would like my parents to insulate or otherwise reduce our home heating.

Subscale 8 - Job Availability (JOBAV)

These items showed the youth's perception that energy conservation will increase the number of available jobs. The subscale contained two items.

Items: 9. Saving energy will cause people to lose jobs.

46. Energy conservation will produce new jobs.

Subscale 9 - General Feasibility and Favorability (FAVOR)

This subscale contained nine items and measured the degree to which the youth believes that individual conservation efforts can produce an impact on the energy problem and that saving energy "makes sense."

Items: 3. I am willing to change the way I live to save energy.

4. I am willing to go to sports events right after school (instead of at night) to save lighting energy.

5. Energy conservation is one of the most important goals of my age group.

13. We can decrease our need to build more power plants by asking people to save energy.

14. The effort made by individuals to save energy can have a major effect on our energy problem.

17. I would like my family to reduce their use of electricity.

23. Solving energy problems through saving energy will cost less than building new power plants.

33. My efforts can help solve the energy problem.

38. I am willing to take cooler showers or baths to save energy.

Behavioral Scale

Subscale 1 - Automotive Conservation (AUTOCO)

This subscale contained six statements and was intended to measure the youth's behavior toward using a car less to save energy.

Items: 50. Trades in a large car for a smaller one.

52. Carpooled ten times or more.

58. Chosen at least five times to walk or ride bus to school instead of riding in a car.

60. Figured your family's gas mileage.

62. Ridden a public bus (not a school bus) over three times.

63. Tried to save gasoline by driving or riding in a car less.

Subscale 3 - Solar Energy (SOLAR)

This measure contains one item and measures the youth's behavior toward using solar energy.

Item: 51. Installed a solar collector.

Subscale 4 - Willingness to Make Specific Commitment, Sacrifice (SACRIFICE)

This subscale contained four items and stated youth's behavior toward devoting personal time to work in energy conservation activities.

Items: 47. Added three inches or more of insulation to your home.

48. Caulked or weatherstripped your home's doors or windows.

56. Helped someone insulate, caulk, or weatherstrip a home (including your own).

59. Turned off lights to save electricity more than 10 times.

Subscale 7 - Home Heating and Cooling (HOMETEMP)

This topic indicated the youth's behavior toward reducing the use of air conditioning in the summer and heat in the winter to save energy. The subscale consisted of three items.

Items: 49. Lowered the thermostat by three degrees or more.

53. Put blankets or plastic over windows to save heat.

54. Installed a wood-burning heater or wood-burning stove.

Subscale 9 - General Feasibility and Favorability (FAVOR)

This subscale contained four items and measured behavior that individual conservation efforts can produce on the energy problem and that saving energy "makes sense."

Itsms: 55. Asked your parents to do any of the above tasks.

57. Talked to your parents about the need to conserve energy.

61. Taken a cooler or shorter shower to save hot water.

64. Saved energy in any other way.