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ENERGY CONSERVATION EDUCATION: A TASK-ORIENTED APPROACH

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Nancy Jean Leedom

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ABSTRACT

ENERGY CONSERVATION EDUCATION: A TASK-ORIENTED APPROACH

By

Nancy Jean Leedom

Conservation has been identified as an important part of the solution to the current energy shortage. The literature was reviewed for potential interventions which would have the effect of promoting pro-energy conservation attitudes and behaviors. A task-oriented approach to energy education, which involved the student in actual energy conservation activities, was identified as the educational technique most likely to achieve both attitude and behavior change favorable to energy conservation.

This task-oriented approach to energy education, which included an information component as well as an energy conservation activity program, was compared to an information only approach and a no-treatment control group in a one-way analysis of variance design.

The results indicate that students who received the task-oriented intervention developed more extreme pro-energy conservation attitudes than the information only group or the control group. There was no difference between the latter two groups. There was no evidence that attitudes translated into behavior, either as measured by a self-report questionnaire or by actual household consumption of electricity or natural gas/fuel oil.

Various recommendations were made for improvement of the task-oriented manipulation and for future research.

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INTRODUCTION

The Energy Problem

It was not until the international oil crisis of 1973-74, and the attendant long lines and rationing at the gasoline pumps, that most Americans realized the United States had an energy problem. The Arab oil embargo did not cause the energy problem, but it did serve as a demonstration that a problem existed in the United States.

The roots of the problem are related to patterns of consumption and the use of nonrenewable resources. America is an energy-intensive society, consuming more total energy than any other country. While the U.S. population only accounts for 6 percent of the world's population, Americans consume 30 percent of the world's per annum total energy production (Koenig, Note 1). This high demand, coupled with the fact that America's energy supply is based largely upon dwindling fossil fuels (petroleum, natural gas and coal), clearly poses a problem.

Conservation has been proposed by some as a "time-buying" strategy to keep the country from depleting fossil fuel reserves before alternative energy sources can be developed. However, many experts are predicting a 25-year period of development before these alternatives will be ready for wide scale use. It seems clear that, for this generation at least, conservation will, by necessity, become a way of life (Clinard & Collins, Note 2). Many observers have concluded that conservation would be a responsible start toward a real solution to the energy situation, rather than postponement of an inevitable disaster (Canfield & Sieminski, 1975). Until such time as an unlimited and inexpensive source of energy becomes a reality, this would seem to be a practical outlook.

A summary of findings from existing social scientific studies of energy conservation attitudes and behaviors (Olsen & Goodnight, Note 3), in general, showed that the American public has thus far adopted a minimal number of conservation practices (e.g., turning down home lighting and heating). During a crisis period (such as the oil embargo), the results of various surveys indicated that from 63 percent to 93 percent of families did engage in these minimal conservation practices. However, once the crisis had passed, the percentages of families engaging in conservation dropped substantially. In addition, proportionally fewer individuals adopted any significant conservation measures, such as insulating their homes or purchasing smaller cars. The conservation efforts generally reported via survey studies have involved minimal effort and no significant change in lifestyle on the part of American energy consumers (Rappeport & Labaw, Note 4).

It does not appear that this lack of effort is the result of disbelief in an energy "crisis." Olsen and Goodnight (Note 3) concluded from survey findings that a large majority of the U.S. population has some general understanding of the basic energy situation. More specifically, of the surveyed persons, at least half believed that the energy crisis was real, either when surveyed or when asked to assess future availability. Findings vary depending upon the wording of questions and the time period involved, but in general, surveys indicate that anywhere between 38 percent and 64 percent believe that the country faces a long-term energy problem. It should be noted, however, that empirical research conducted thus far has found little or no relationship between belief in the reality of the energy problem and any actual energy conservation behaviors (Olsen & Goodnight, Note 3).

Most social scientific work concerned with energy conservation and consumption has appeared within the past five years, and a large number of studies are so recent that they are not yet published. The majority of the investigations have been exploratory and descriptive in nature. An overview of these studies suggests that the research can be divided into two broad areas.

The first area is the cognitive approach. This broad approach uses communication to achieve a verbal commitment or change in attitude towards energy use on the part of individuals exposed to the communication. More specifically, the cognitive approach has been operationalized into (2) informational programs, (b) feedback programs, or (c) systematic persuasion efforts. Informational programs involve providing to individuals knowledge of the overall energy problem confronting the U.S. or information regarding suggested ways to conserve energy. In feedback programs, individual energy consumers receive information concerning their consumption levels. Persuasive efforts attempt to convince people of the seriousness of the energy problem and to get them to adopt favorable attitudes.

The second approach characterizing the social scientific work in energy conservation, the behavioral approach, uses rewards or financial inducements to elicit conservation from individuals. The primary methods utilized by behavioral researchers have included (2) pricing and (b) incentives. Pricing adjustments involve raising the price of energy (either "naturally" in the marketplace or "artificially" by taxes) as a means of limiting consumption. With the incentive strategy, persons are offered either financial incentives or social rewards (e.g., social approval) for adopting energy conservation practices.

After reviewing a large number of the studies completed in the last several years, Olsen and Goodnight (Note 3) concluded that the cognitive approaches which rely on information and persuasion are the least effective in terms of altering energy consumers' attitudes and behaviors. They further concluded that the behavioral approaches of pricing and incentives have been the most effective in promoting specific, short-term behavioral changes in energy consumption. Evidence relevant to both the cognitive and behavioral approaches will be examined in the sections below.

The Cognitive Approach: Information, Feedback, and Persuasion

In a very short time, a great deal of written material has appeared related to energy. Countless "how to" booklets have been distributed, both privately and publicly, describing various energy conservation methods. However, most of the available evidence suggests that printed material is not effective in changing the energy consumption behaviors of individuals. For instance, Lounsbury (1973) found that a newsletter alone was ineffective as a means of increasing environmental action among a sample of midwestern housewives. A study by Heberlein (1975) on the effect of informational material designed either to increase or decrease the amount of electricity use in an apartment complex (N = 96 apartments) found that the provision of information resulted in no change in electricity consumption among residents. The information was mailed in the spring of 1973, and a one year follow-up (after the Arab oil embargo had occurred) still found that no significant changes in electricity consumption had occurred.

Hass (1975) examined the persuasive effect of two communication variables: (1) magnitude of noxiousness of the threat of an energy crisis and (b) probability of occurrence of an energy crisis. Increases in the perceived likelihood of an energy shortage had no effect on conservation attitudes, but increments in perceived noxiousness or severity of an energy crisis strengthened self-reported intentions to reduce energy consumption. The authors concluded that information programs should stress the severity of the problem. However, it should be noted that these authors utilized verbal "intentions" as a dependent variable and not actual consumption behaviors. Therefore, it cannot be concluded that this method has any actual effect on energy conservation practices.

Seligman and Darley (1977) examined the effect of providing consumption feedback on the use of home air conditioning by 40 families in a planned urban development. Their experimental design consisted of a "feedback" group and a control group. Both the control and the feedback groups were informed that air conditioning was the largest energy user in households and its use should be curtailed when possible. The experimental group (feedback group) was given consumption feedback on a daily basis (Tuesday-Friday). The feedback consisted of percentages which indicated the degree to which participants' actual consumption deviated from predicted consumption. Both the experimental and control group subjects used significantly less electricity during the treatment period compared to baselines established during a prior five week period. This was partly due to cooler weather in the treatment phase. However, the feedback group consumed 10.3 percent less than the control group. Within the feedback group, the lower the initial level of consumption, the greater the amount of conservation during treatment. This result suggests that feedback is more successful with moderate users than with high users of electricity.

A study by Seaver and Patterson (1976) assessed two methods of facilitating fuel oil conservation. Differential feedback was given to households following their first oil delivery. In the informational feedback only condition, customers received a slip which outlined several items, including their rate of increase or decrease in consumption for the present delivery period in contrast to the previous winter, and an indication of the monetary savings or deficits compared to what they could have expected to pay if their usage had continued at the rate of the previous winter. In a feedback plus commendation condition, customers received exactly the same feedback, but they also received a decal which said, "We are saving oil." Receiving the decal was made contingent on reducing the rate of consumption from the previous winter. A control group received only the usual delivery ticket and no feedback or reward. The consumption levels of the feedback plus commendation group subjects (based on consumption recorded at the second delivery of the winter) were significantly lower than those exhibited by the feedback only and control group subjects.

It should be noted that this study was conducted from February through May, 1974, during an acute oil shortage, and this may have contributed to the significance of the decal.

In summary, it would appear that in comparison to the information and persuasion approaches, which have not been successful energy conservation interventions, the feedback approach has achieved some moderate reductions in energy usage. In the next section, the feedback approach is contrasted with the incentive approach in several studies.

The Behavioral Approach: Pricing Adjustments and Incentives

The results of various survey investigations conducted during the 1973-74 energy "crisis" tend to support the notion that one of the strongest influences on energy use is the pocketbook. Kilkeary (Note 5) found that moderate income consumers were highly motivated to conserve energy while consumers who could afford to pay higher utility and fuel bills were not as likely to have changed their energy usage practices. A survey investigation reported by Hyland et al. (Note 6) also showed that, when there was a response to the energy crisis, this response was primarily due to economic factors. The data revealed that the primary effort to conserve was transportation related (e.g., cutbacks in the number of auto trips per week both locally and long distance). In the household, where the increased cost of electricity was not as evident as at the fuel pumps, there was less of a response to energy cutbacks. Another survey (Rappeport & Labaw, Note 7) found that homeowners were more willing to install attic insulation and storm windows if they were promised a rebate. In addition, immediate rebates were more important to residents than less tangible long-range incentives (Rappeport & Labaw, Note 8). This result indicates that homeowners are not as willing to make capital investments for insulation and storm windows if the only benefit is likely to be in terms of energy savings.

The effects of several inducements on college student driving behavior were studied by Foxx and Hake (1977). In a two condition experimental design, students in the experimental group were offered cash prizes, a tour of a mental health facility, car servicing, or a university parking sticker in return for reductions in their driving behaviors. The values of the prizes awarded were scaled to match differential reductions in driving. Data were gathered from odometer readings, using special precautions to detect alterations. There was a reduction in average daily mileage by the experimental subjects of 20 percent over an initial baseline period. No change from baseline driving levels was noted in the control group. The conclusion of the authors was that some drivers can be motivated by reinforcement contingencies to reduce their driving.

Winett and Nietzel (1975) contrasted monetary incentives and information alone as interventions to promote energy conservation behaviors. Volunteers were matched on prior natural gas and electricity use, and two-week baseline usage levels were observed. Both groups received forms to record their energy use and an eight-page manual which detailed potential energy conservation methods. However, the experimental group was placed on an incentive plan where scaled amounts were paid contingent on the reduction of average gas and electricity use from baseline levels. In addition, bonuses were paid to the highest and "runner-up" reducers. Persons in the incentive group also received feedback every week concerning the amount of energy they used, their percent change from baseline, and the amount of incentive they earned. The incentive group averaged approximately a 15 percent greater reduction in electricity use than did the information only group, which averaged about an 8 percent reduction. There was a trend for these differences to be maintained at a two-week and two-month follow-up. While the data on natural gas did not show any differences between the groups, it should be noted that the primary determinant of natural gas use is temperature, and this experiment was conducted in the winter months in Kentucky. As would be expected, the groups tended to use more gas when the temperature dropped below baseline recordings and less gas when it rose above baseline. Post-hoc interviews with the residents of households achieving the largest reductions revealed that these families exerted more than only minimal conservation efforts (e.g., turning down lighting and heating). For instance, these residents installed insulation, closed off rooms not in use, and repaired appliances.

Kagel, Battalio, Winkler, and Winett (Note 9) conceptually replicated the Winett and Nietzel study, with the major difference being that Kagel et al. attempted to alter electricity usage devoted to space cooling in the summer months in the Southwest. Thus, the major sources of electricity consumption differed in the two studies. After baseline recordings were observed, subjects were assigned to either a high-price rebate group, low-price rebate group, a feedback only group, an information only group, or to a no-treatment control group. Subjects in the high-price rebate group received payments of 30¢ for each 1 percent reduction in weekly electricity use compared to their average use during the previous summer. The low-price rebate group received a payment of 1.3¢ for each KWH reduction in weekly electricity use. Only the high-price rebate condition produced a reduction in electricity usage (compared to the other groups and the control) and this reduction was quite small (5 to 8 percent). No differences emerged between the feedback and control groups.

Hayes and Cone (1977) examined the effects of payments, information, and feedback on the consumption of electricity among apartment dwellers in a master-metered apartment complex. For the experiment, separate watt-hour meters were installed for residents (N = 4). It should be noted that space and hot water heating were provided by gas, and therefore, the target was a reduction in use of appliances and lighting. The study was designed so that order of treatment varied across the apartment units, and all families received all treatments. Hayes and Cone found that monetary payments produced immediate and substantial reductions in electricity consumption in all four units, and this relationship continued even when the amount of payment was substantially decreased. Feedback resulted in only minor and temporary conservation attempts. The provision of information about ways to conserve and the typical cost of using various appliances had no effect on consumption. In general, combinations of payments and either information or feedback were found to produce no greater levels of conservation than obtained by payments alone.

Connecticut Power (Note 10) in a Federally funded experiment, attempted to determine if residential users of electricity would appreciably change their lifestyles in order to reduce their electricity bills. This study essentially assessed the effects of pricing incentives and disincentives on peak period use. Peaking is the tendency for electricity users to consume at high rates for brief periods during the day (e.g., from 5 p.m. to 8 p.m.). Each home that participated in the study was outfitted with a meter which recorded use during 15 minute segments. Homeowners were charged 16¢ per KWH during peak demand periods and 1¢ per KWH during power lulls, with 3¢ per KWH being levied the rest of the day, on weekends and designated holidays. The results indicated that few customers in the experimental group significantly changed their usage patterns during the warmer months, but nearly all used less electricity during peak periods in the winter than did residents in the control group or the average company customer.

Kohlenberg, Phillips, and Proctor (1976) examined the effects of information, feedback, and incentives on the peaking behavior of middle-class families in Seattle during the winter months. Here, a combination of feedback plus incentives proved to be the most effective, reducing peaking by about 50 percent. However, when the experimental treatments were removed, subjects returned to pretreatment patterns of consumption. Since only three families were used in this study, generalization is restricted.

In a review of recent experiments using behavioral methods to achieve energy and material conservation, Shippee (in press) concluded that cash payments or financial incentives have been the most effective interventions assessed to date. The results of the studies reported above support this conclusion. Reductions in energy consumption which have resulted from the feedback approach, in general, have not been as great as those found when incentives or rewards were utilized. However, interventions utilizing incentives and rewards are not without their problems. According to Shippee, transiency of effects has been one of the main difficulties with these types of studies. To date, only short-term conservation attempts have been shown to result from incentive programs. Shippee points out that incentive programs may act to undermine any intrinsic desire to conserve energy, thereby precluding long-term behavioral change. Future research on incentive interventions should examine this issue. Another major shortcoming of incentive programs has been that they are not generally very cost-effective.

The Need for Information and Education

The above analysis suggests that interventions involving the provision of information regarding the energy problem and how to conserve energy have been the least effective in achieving reductions in the use of energy. In spite of this, the informational approach cannot be abandoned. Individuals must receive some minimal education and skills before they can begin to conserve at all. Surveys have shown that a large number of individuals hold mistaken beliefs about energy matters. For instance, 54 percent of those surveyed by Rappeport and Labaw (Note 11) believed that keeping a light bulb on uses less energy than turning it on and off several times an hour. Also, in the same survey, 50 percent of the respondents believed that showers used more hot water than baths. In addition, 42 percent did not know that it takes less fuel to restart a car than to keep it idling for 15 minutes. Another survey (Rappeport & Labaw, Note 12) found 55 families without insulation in their homes. Of these, 43 did not know how much it would cost to install the same. When viewed in light of the serious deficiencies which characterize the behavioral approaches, these data suggest that an educational program might possibly contribute greatly as a conservation intervention. Specifically, if conservation education were included as a part of regular school curricula, the resulting cost would be low, and the chance for potential impact would be maximized.

The State of Conservation Education in the Schools

Recently, there has been some attempt to correct informational deficits by including energy education in schools. However, this is a new approach, and its recency is reflected in the sparseness of literature devoted to energy education. An even greater problem is the lack of evaluation of the effectiveness of the energy education approaches which are being proposed. In fact, only one evaluated program, "Energy and Society" (Hickman, 1977), was found. This curriculum package for high school students emphasizes the development of "self-direction, questioning, problem-solving and decision-making." One component, a field project, involves individual topic selection, field and library research, and the development of an energy recommendation for the community. Lectures, texts, tests, and grades are de-emphasized. No provisions are made for explicit behavior change or behavior measurement, and the package is susceptible to criticism for this reason. An examination of the data concerning the acquisition of energy knowledge revealed that on 43 percent of the total items, over 30 percent of the students did not know the correct answer. Therefore, the program could be described as only a fair means of increasing knowledge about energy-related issues. In addition, the data showed that some, but not all, of the students learned the "correct" environmental attitudes. (Correct answers were those judged by the project staff to be the answers most likely to be given by an environmental special interest group, e.g., agreement with the statement, "We should rely on renewable rather than non-renewable fuel sources.") However, it is not clear how to interpret this information. A large body of social psychological research has demonstrated that attitude measures without related behavior measures are relatively uninformative (Kelman, 1974; Wicker, 1969). Additionally, Troost and Altman (1972) have shown that there is only a small correlation between cognitive achievement and the types of values and concerns which necessarily demonstrate commitment to positive social goals. Hoover and Schutz (1963) have also found that the traditional text and various conservation topics in the classroom had little effect on the development of positive conservation behaviors.

Some of the above literature is drawn from a related educational area, that of environmental education. Environmental education is an older discipline, and because of this, the schools have had more time to develop curricula and set goals. According to one source (U.S. Government Printing Office, 1971), environmental education is "intended to promote among citizens the awareness and understanding of the environment, our relationship to it, and the concern and responsible action necessary to assure our survival and to improve the quality of life" (p. 5). Environmental education stresses individual decision-making which reflects an understanding of the effects of technology and consumerism on the environment.

Troost and Altman (1972) emphasize the practical side of environmental education--the fact that individuals must be knowledgeable about their environment and its problems if they are going to be motivated or capable of working towards a solution to environmental problems. Troost and Altman suggest that, in addition to taking direct action on environmental problems, citizens must be knowledgeable enough to cast votes on community issues which relate to the environment, etc. These authors stress that the tools necessary for citizen action are a strong general education, understanding of our natural resources, ecological, economic, and political awareness, problem solving ability, and an understanding that man is part of the human ecosystem. They, therefore, recommend an interdisciplinary approach,

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rather than specific courses in environmental studies. This approach is also recommended in the U.S. Government Printing Office document (1971).

In summary, environmental education has been oriented to providing information for the formation of adaptive environmental values and attitudes and to facilitating decision-making and action favorable to the environment. One question which arises is whether environmental education alone, or the educational model it provides, can foster energy conservation. By educating our citizenry to be environmentally aware, are we solving our energy problems? Relatedly, have past educational curricula utilized the most efficient classroom strategies for changing students' environmental attitudes?

The Attitude/Behavior Controversy

The above questions highlight one problem that should be considered in energy education learning contexts. Specifically, does a discrepancy exist between attitudes formed on the basis of learning and those attitudes which serve as the basis of overt behavior? One finding of an experiment by Lounsbury (1973) was that great differences exist between action and attitude. He recommended that environmental attitudes not be used as the main indicators for action programs concerned with fostering environmentally responsible behaviors.

Until about 10 years ago, it was implicitly assumed that attitudes were generalized predispositions to behave in a particular fashion. It followed from this conception of attitudes that changes in these predispositions should be followed by corresponding changes in behavior. Research relevant to this topic has unfortunately indicated that such a conclusion lacks supporting evidence. Changes in attitudes are not necessarily accompanied by changes in behavior (Zimbardo & Ebbesen, 1969). According to Wicker (1969), as early as 1934, there was published evidence which was inconsistent with the assumption that attitudes and behavior are closely related. He cited an experiment by LaPiere as especially supportive of this viewpoint. In a time when there was much anti-Chinese sentiment in the U.S., LaPiere (1934) took several extensive automobile trips with a Chinese couple. Unknown to his companions, he took notes of how the travelers were treated, and he kept a list of hotels and restaurants where they were served. Only once were they denied service, and LaPiere judged their treatment to be above average in 40 percent of the restaurants visited. Later, LaPiere wrote to the 250 hotels and restaurants on his list asking if they would accept Chinese guests. Over 90 percent of those responding indicated they would not serve Chinese, in spite of the fact that all had previously accommodated LaPiere's companions. However, one element of this study makes a clear-cut interpretation of the results impossible. Specifically, there were obviously different behaviors involved in refusing to accept Chinese guests by mail and refusing to accept them in person.

In most research on attitudes, no distinction is drawn between the affective and cognitive components of attitudes, since in practice, both are assessed by verbal measures. The term overt behavior is used to refer to nonverbal forms of behavior outside the situation in which the attitudes were measured. Practically all attitude research is on the verbal level, and yet the validity of attitude measures (the degree of the relationship between overt nonverbal and verbal behavior) is usually not known. Wicker (1969) recommends that attitudes and behaviors be measured on separate occasions and that the overt behavioral responses measured not be merely the retrospective verbal reports of a person's own behavior.

Wicker's review provides little evidence to support the existence of stable, underlying attitudes within the individual which influence both verbal expressions and actions. Taken as a whole, the studies reviewed by Wicker suggest that only about 10 percent of the variance in overt behavioral measures can be accounted for by attitudinal data.

Education and Experience: An Active Type of Learning

Forming the appropriate attitudes among students is insufficient unless those attitudes lead the student to take pro-energy conservation actions. Therefore, a central concern of energy education is that of identifying which educational experience will most effectively influence behavior through the alteration of attitudes.

Many researchers involved in environmental education (Hammerman & Hammerman, 1968; Shomon, 1964; Swan & Stapp, 1974; Vivian, 1973) have expressed concern over the traditional "classroom concept." They feel that the individual learns best from direct, purposeful experience. According to this view, the learner can develop attitudes through personal experiences that he/she cannot develop through the presentation of information in the typical classroom lecture situation. In addition, individuals are most likely to make wise decisions in areas in which they have had prior experience in decision-making, not merely knowledge. These researchers assert that community resources are especially applicable to supplement an active form of educational curriculum. When the learner has an opportunity to study some of the community's resources under natural conditions, this provides certain learning experiences that cannot be duplicated in the classroom.

The traditional field trip into the community does not totally meet the above criteria. According to Riban (1976), there are certain factors which reduce the effectiveness of a field trip. Field trips are usually expository in nature, and their goals could frequently be accomplished with slides and physical samples illustrating major points. In addition, the time exposure is too brief, and the teacher is usually seen as the expert, while the student fills the role of novice. This means that the greatest burden for learning is still on the teacher.

Other, less traditional types of field trips have been recommended where more than show-and-tell is done (Skinner, 1975). With these nontraditional approaches, students do the observing, recording and discovery. One such approach was evaluated by Howie (1975), using four groups of fifth grade students. One group received ten one-hour classroom sessions, which included discussion by students. The classroom sessions consisted of the introduction of concepts and ideas which were closely related to the type of environmental activities that were conducted in the outdoor set of activities. Another group received an outdoor treatment which was structured to provide the guided discovery of the concepts presented in the classroom. A third group received the classroom sessions, followed by the outdoor treatment. A control group received no environmental education. The posttest instrument consisted of 15 questions drawn from concepts that were considered basic to environmental education. In addition, 15 items concerned with the application of experiences to the appropriate conceptual areas were also included. In every case, the students who received one of the environmental education treatments scored significantly higher than the control group. This result suggests that environmental education does lend itself to ready application. However, when the classroom treatment was compared with the combined classroom-outdoor treatment, there was no significant difference between them. In addition, the organized classroom program was superior to the outdoor discovery type of learning. This finding is contrary to the spontaneous discovery method of teaching. To explain this disparity, the researchers recommended that classroom preparation is necessary before students can benefit from an outdoor program. In addition, instead of the experience taking on the appearance of a field trip, they suggested that an outdoor laboratory might be better.

This example illustrates some of the beliefs held by John Dewey, one of the foremost educational philosophers. Dewey was in favor of learning experiences in the community because ". . . all principles by themselves are abstract. They become concrete only in the consequences which result from their application" (1952, p. 6). However, he was also in favor of organized classroom experience to supplement the field experience. Dewey criticized many of the "progressive" schools because they practically ignored organized subject matter and instead proceeded as if any guidance by adults was an invasion of individual freedom. The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally equated. If an experience has the effect of arresting or distorting the growth of further experience, it is mis-educative.

Dewey did not claim that the traditional schoolroom was a place in which pupils had no experiences. However, the kind of experiences they had were the wrong kind: they were not connected with further experience. What is learned in the typical classroom is so foreign to the situations likely to be encountered by students outside of the classroom that it does not teach students to have control over life outside. Dewey felt that it was important for students to know how to utilize their surroundings, both physical and social, so as to extract from them all that they have to contribute to building experiences that are worthwhile. He pointed out that knowledge gained in isolation remains there and can only be used in similar situations.

According to John Holt (1976) experience and learning are one in the same: People learn about the world from living in it, working in it, and changing it. A common and mistaken idea hidden in the word "learning" is that learning and doing are different kinds of acts. Holt uses himself as an example to clarify this important point. He writes of when he first began to play the cello: "I love the instrument, spend many hours a day playing it, work hard at it, and mean someday to play it well. Most people would say that what I am doing is 'learning to play the cello.' Our language gives us no other words to say it. But these words carry into our minds the strange idea that there exist two very different processes: (1) learning to play the cello and (2) playing the cello. They imply that I will do the first until I have completed it, at which point I will stop the first process and begin the second; in short, that I will go on 'learning to play' until I 'have learned to play,' and then I will begin 'to play'" (p. 13). What Holt makes very clear here is that there are not two processes. Instead, we learn to do something by doing it.

Further Support for Active Attitude Acquisition

Research in the attitude change literature provides empirical support for the idea that active participation in a task promotes attitude change. For instance, Zimbardo and Ebbesen (1969) describe a series of role-playing experiments designed to produce changes in attitude. Although the studies varied considerably in the form of role-playing utilized (from debate to psychodrama) they shared the minimal requirement of the technique, which is that the subject become involved in the attempt to present, sincerely and convincingly, the attitude position of another person. The self-persuasion which occurs as a consequence of effective role-playing is also interesting because it does not fit the traditional attitude change model. The change in attitude is the result of a person's communication to him/herself of a counter-attitudinal position. The conclusion derived from this body of research is considered to be the most reliable in the area of attitude change: Active participation is more effective in changing attitudes than is passive exposure to persuasive communications.

Bem (1970) claims that behavior and the conditions under which it occurs are one of the major foundations of an individual's beliefs and attitudes. Although the cognitive, emotional, and social factors also have their individual effects, it remains true that changing an individual's behavior is one of the ways of producing change in his/her beliefs and attitudes. Bem reports that previous studies have shown that "saying becomes believing" whenever an individual makes statements under conditions in which he/she expects to be telling the truth. Thus, maybe a person might also be confused or misled by false statements or false confessions made under "truth" conditions. To test this possibility, Bem conducted an experiment with "truth" and "lie" lights. Subjects were first required to perform some act ("crime") about which they could be questioned later. The "crime"consisted of crossing out some words on a list and not crossing out others. Each subject then went through a preliminary training session in which the task was to learn to make true statements whenever an amber recording light was on and false statements whenever a green recording light was on. Then, the subject was required to make statements about the words on the list. Sometimes the subject was required to state aloud that he/she had crossed out a word. Unknown to the subject, half the statements required to be made were true, and half were false. Sometimes the amber light was on as a "confession" was made and sometimes the green light. After each confession, the subject was required to indicate on a sheet of paper whether or not he/she recalled crossing out the word. The subject also estimated the "correctness" of his/her memory. The results of this study showed that in the presence of the "lie" light the false confessions had no effect. However, in the presence of the "truth" light, false confessions were believed. That is, subjects made many more errors of recall and were far less sure of their memories in the presence of the truth light. This was a rather contrived experiment, but it does demonstrate that by changing an individual's behavior one can also change that individual's beliefs.

Research by Breer and Locke (1965) tested their assertion that people create their attitudes at least partially as a result of task experience. These experimenters use attitude as a generic term for an individual's cognitive, cathetic, and evaluative orientation towards objects in his/her environment. This refers to beliefs, preferences, and values, respectively. Their basic thesis is that in working on a task an individual develops certain beliefs, values, and preferences specific to the task itself. In addition, Breer and Locke have suggested that over time these beliefs, values, and preferences are generalized to other areas of life.

Also important in their theory is the fact that in the performance of a task certain forms of behavior will have higher instrumental reward value than others (i.e., they will contribute significantly to the achievement of the goal upon which rewards are contingent). By virtue of the reinforcing quality of task outcomes, these particular forms of behavior will have a better chance of being emitted than other competing behaviors. Individuals working on a task can be expected to respond cognitively (through apprehending the instrumental nature of the act), cathectically (by developing a positive attachment for this kind of behavior), and evaluatively (by defining such behavior as legitimate and morally desirable). For example, if cooperation is instrumental to achieving task success, it will be perceived as important for solving the task, cathected as intrinsically enjoyable and evaluated as legitimate and appropriate. Attitudes toward cooperation can thus be explained in terms of the object of the attitude (cooperation) and the individual goal (success) to which it is instrumentally related.

In order to test their theory that task experience could change attitudes, Breer and Locke performed one classroom experiment, followed by six experiments in a small-group laboratory. They dealt with very broad attitude dimensions such as individualism-collectivism, equalitarianism-authoritarianism, theism, and achievement. In the early experiments, subjects performed a Bales prediction task, and the experimenter manipulated performance scores in such a way as to guarantee that each subject would always do better when performing the task one way or the other. In later experiments, subjects were exposed to four different tasks, all of which lent themselves to some organizational strategy (i.e., working alone or together). This method probably allowed subjects to more effectively generalize beyond the experiment because they were rewarded for the same behavior in a variety of tasks. In the final experiment, controls were relaxed, and subjects were able to choose which way they wanted to perform the task. Most chose to work in groups, but prior to each task they were reminded that they could choose to work alone. This tended to prove that a formalized "trial and error" sequence, in which one organizational strategy is systematically contrasted with another, is unnecessary for producing significant attitude change.

A Likert-type attitude questionnaire was given as a pre- and posttest. The questionnaire was designed to measure a variety of task areas. Over the course of these studies, the experimenters were successful in changing a wide variety of attitudes from specific beliefs about the most effective way to organize a work group to abstract values concerning the relationship between the individual and society. This evidence is taken to mean that task experience is capable of exerting a powerful influence on all sorts of beliefs, values, and preferences which to the casual observer appear to be only remotely related to the task itself.

In some experiments, subjects were paid according to task performance, and in others, they received a flat rate. The results were equally good in both cases. It can be argued that task experience has an impact on attitudes whether performance incentive is extrinsic (paid according to how well you do) or intrinsic (the feeling of accomplishment you get from performing a task well, regardless of the external reward involved). Generally, it appears that the type of incentive makes no difference, but the degree to which a person is rewarded probably is a critical factor in the change process.

Since the experimenters used more than a dozen different tasks over the course of the seven experiments, they can assert considerable generalizability over conditions. However, only in an abstract sense can their game-like tasks be said to resemble day-to-day tasks. Their theory would also appear to be generalizable across attitude dimensions. Only in the area of attitude measures do their experiments suffer since they provide no evidence of construct validity (whether they measured what they set out to measure).

Summary and Hypotheses

In summary, it appears that the attitude change research examined above provides support for an active form of energy education, as proposed by many educators. More specifically, it appears that an educational approach which involves the student in actual energy conservation tasks is more likely than a traditional, "passive" approach to lead to the development of: (a) more extreme pro-energy conservation attitudes, and (b) more intensive energy conservation behaviors in the future.

The present study was designed to test this notion among high school students. The design of the study included two experimental treatment groups and a no-treatment control group. One experimental group received a passive, informational type of energy education curriculum. The other experimental group received the passive curriculum, but in addition, subjects in this group received an active energy education curriculum which emphasized participation in actual energy conservation activities.

Consistent with the attitude-behavior and educational literatures, it was hypothesized that the active learning group would develop more extreme pro-energy conservation attitudes than either the passive, information group or the control group. It was also anticipated that, after the initial experimental period, the active learning group would exhibit a greater reduction in household energy usage (when compared to the previous year's usage levels) than the passive, information group or the control group. Finally, it was expected that the households in the active learning group would perform significantly more energy conservation tasks (as obtained via self-report) than either the passive, information group or the control group. In the case of all the above predictions, the passive, information group was not expected to differ from the control group.

METHOD

Overview

The experimental design of the present study was a one-way, three condition, completely randomized design which varied whether students received no treatment (Control (CON) group), an informational workshop about energy problems and conservation (Information Only (INFO) group), or the informational workshop plus an energy conservation activity program (Task-Oriented (TO) group). The primary dependent variables were students' attitudes concerning energy conservation and the energy consumption behaviors of students households obtained from utility company records (e.g., natural gas, fuel oil, propane, or electricity consumption).

Sample

The sample of the present study consisted of 84 students from 12 high schools located in three counties (Marquette, Baraga, and Houghton) of the upper peninsula of Michigan. Students ranged from 14 to 18 in age and from 9 to 12 in grade. This sample was obtained through the cooperation of the Michigan Energy Extension Service (MEES). Recruitment efforts will be described below.

<u>Initial Recruiting</u>

The three county area described above was designated as Region 5 in a larger, statewide study which was conducted by MEES. Originally, 15 schools were identified as participants in this region, and three of these schools (one from each county) were randomly assigned to the control school condition. The remaining 12 schools were available for the experimental treatments.

The MEES plan for Region 5 was to have groups of students from each of the 12 experimental schools form "teen awareness" teams. These teams would receive education about energy availability problems, and in addition, would receive information about household energy conservation techniques. They would also receive training in public speaking and presentation skills. The task of the teams would then be to return to their respective schools and other schools in the community and share their knowledge by giving classroom presentations.

MEES training plans called for a one-day workshop to occur outside of school. Recruitment for the workshops was performed by the MEES coordinator for Region 5 and by the experimenter. Letters were sent to the principals of the 12 high schools, and they were asked to select from their faculties an interested teacher to act as a teen awareness team advisor. Students were chosen as team members based on recommendations by teachers and principals. Students were selected on the basis of the following qualifications: high motivation, leadership qualities, respect by their peers and/or an interest in energy issues. Students were chosen from the control schools using the same criteria. However, these students were never asked to participate in teen awareness teams or to attend a training workshop.

Subject Assignment and Attrition

Prior to the occurrence of the training workshop, three of the twelve experimental schools withdrew from the experiment because of scheduling conflicts. The remaining nine schools were randomly assigned to the experimental treatments with four schools being assigned to the TO group and five being assigned to the INFO group. As described earlier, three schools were randomly assigned to the no information control group.

Procedure

The experimental manipulations for the INFO and TO groups involved providing an identical information component to both groups and a task-oriented activity to only the TO group.

The Information Manipulation

The information manipulation consisted of the training workshop previously described. Two identical workshops were conducted so that students would not have to travel long distances (in some cases over 60 miles). Students in the Marquette area attended a workshop on April 4, 1978, and those in the Houghton/Baraga area on April 5, 1978.

At each workshop, students received information on the United States energy situation in the form of films, lectures, and printed materials (a list of printed materials is presented in Appendix A). They also participated in values clarification exercises related to their own energy beliefs and other exercises designed to increase their awareness of energy use. A complete agenda for the workshop is presented in Appendix B.

Request for Volunteers for the Study

At approximately 4:00 p.m. on the day of the workshop, students were asked by the experimenter (who up to this point had been an observer) to participate in an energy study. The study was described as an attempt to plan for future energy education programs by obtaining information regarding students' attitudes about energy and the energy usage patterns of their families (see Appendix C). Students were told that at some future time they would be asked to complete a questionnaire regarding their attitudes about various energy related issues. They were also given utility company release forms to be signed by their parents so that their family's energy use patterns could be monitored (see Appendix D). It was stressed that participation was optional, but each student agreed to complete the questionnaire and to take home the forms for parental consideration. Students then completed a workshop evaluation questionnaire at the request of the experimenter (see Appendix E).

Assignment to the INFO and TO Groups

With the administration of the workshop evaluation questionnaire, the procedures for the INFO and TO groups ceased to be identical. Students assigned to the INFO group were asked to participate in an energy related activity (they observed the uses of an energy simulator). Those in the TO group were requested to follow the experimenter into a separate room to receive an "optional" special assignment.

The Task-Oriented Manipulation

The task-oriented manipulation consisted of an optional homework assignment to be completed by students. The assignment (which was to begin the following Saturday) was described via the instructions in Appendix F-1. Briefly, students were asked if they would be willing to participate in a two week energy conservation project. They were told that it would be necessary for them to keep track of their family's energy usage during that time by reading their electric and natural gas meters (or fuel oil or propane gauges, if applicable) on three separate occasions. It was explained how they would use these meter readings to compare a "baseline" week of family use when there was no attempt to conserve energy to a second week when they made an intensive effort to reduce the family's energy consumption. Emphasis was given to the fact that during the second week a major effort to conserve would be required and the entire family's cooperation would be needed.

In addition to the above instructions, students were also given the following items: (1) printed instructions on how to read electric and gas meters, (2) a list of 68 suggested ways to save energy around the home, (3) forms on which to record meter readings, and (4) forms on which to compute each week's consumption and determine the difference between the two weeks. (For copies of these items, see Appendices F2 to F5, respectively.) At this point, students were asked about their willingness to participate and all students consented.

One additional component of the TO manipulation involved a phone call to the students in the TO group during the "baseline" week. The purpose of this phone call was to inquire if students were having any problems reading meters. In addition, the experimenter also attempted to assess if students had enlisted their family's cooperation for the "conservation" week. This phone call also acted as a check to see if students were actually performing the TO tasks. It should be noted that it was necessary to contact all 84 students by phone at least once to request that they return the various forms required, one of which was the release to be signed by their parents to allow access to utility company records.

A Summary of the TO and INFO Manipulations

The experimental treatments of the TO and INFO groups can be summarized as follows: Both groups attended a day long workshop and both received printed materials (including instructions for reading meters and saving energy at home). However, only the TO group was asked to participate in a two week energy conservation project with their families.

The Control Group

The control group received no treatment of any type. The study was introduced to these students during a personal visit to each control school by the experimenter. At that time, the concept of a control group was explained to them, and they were given the same general description of the study as the TO and INFO groups. They were asked about their willingness to complete an attitude questionnaire and were also asked to take home a release form for their parents to sign so that their home energy usage could be monitored.

Dependent Variables

The primary dependent variables consisted of two main outcome measures. The first was a questionnaire which measured student attitudes towards energy conservation and related issues. The second outcome measure was the energy consumption levels of students' households. These data were obtained from the power companies, heating oil dealers, and propane dealers which served students' households.

Three instruments were used as process measures in the present study. These measures were a "home task survey," an essay questionnaire, and a "workshop evaluation" form. In addition, there was one descriptive measure. This measure consisted of a questionnaire which assessed certain demographic characteristics of students' parents.

Outcome Measures

Youth Energy Survey. Students' attitudes towards energy conservation were measured by the Youth Energy Survey developed by the Michigan Energy Extension Service (see Appendix G). This questionnaire consists of three main parts. First, there is a group of 14 items designed to obtain demographic and background information. The second portion of the questionnaire consists of 45 energy conservation attitude items. The final portion of the questionnaire consists of 20 questions concerning respondents' past energy conservation actions.

Of main interest for the present study were the 45 attitude items. These items consisted of a series of statements, each followed by a 5-point Likert-type response continuum, ranging from "strongly agree" to "strongly disagree." In the present study, items were coded so that the most desired response (i.e., strongly agree for positively worded items and strongly disagree for negatively worded items) received a score of 5.

The psychometric properties of the Youth Energy Survey have been assessed in prior research (Kushler & Stevens, Note 13; Stevens & Kushler, Note 14). Factor analyses have resulted in the identification of eight separate subscales, which are listed in Table 1. These subscales were utilized in ancillary analyses in the present study. However, in the main analysis, the subscale scores were combined to form an overall "energy conservation index."

The reliability of the Youth Energy Survey has also been assessed. In pilot testing by MEES (first on 500 students and later on two separate samples of 10,000 students each) reliability analyses of the total scale revealed that the scale possessed high internal consistency--in each case a Cronbach *alpha* of greater than .90. This was also the case in the present study as can be seen in Table 1.

The Youth Energy Survey was used as a posttest for all three groups. It was administered by the experimenter during the week of April 24, 1978, at each of the 12 high schools in the study.

Consumption Records from Power Companies and Fuel Oil and Propane Dealers. In order to obtain a behavioral measure of energy conservation, the actual consumption

Table 1.--Cronbach's Alpha Analysis of Youth Energy Survey.

Content	Number of Items	EES Study* Internal Consistency (alpha)	Present Study Internal Consistency (alpha)
Energy conservation is important	4	.64	.54
Energy conservation is feasible	4	.63	.61
General willingness to sacrifice to conserve energy	4	.68	.69
Willingness to take specific energy conservation actions	7	.79	.78
Automobile related energy conservation	8	.79	.75
Home heating related energy conservation	5	.68	.67
Taxes and energy conservation	4	.57	.52
Government involvement in general in energy conservation	4	.61	.51
Total	45	.93	.93

*Note: Data from first EES pilot of 500 students in five high schools in Michigan. Sites included a mix of urban, suburban, and rural students.

records for the households of the students in the study were collected. As described earlier, releases (Appendix D) were distributed to the students in the TO and INFO groups at the workshop and to the students in the control group at their respective schools. In all, 70 percent of the forms were signed and returned by parents. Accompanying the release was a questionnaire entitled "Home Energy Survey" (Appendix H) also to be completed by parents. The purpose of this questionnaire was to obtain information regarding which types of fuels were used for heating the home, cooking, and heating hot water. In addition, the names and addresses of suppliers were also requested.

On the basis of this information, the appropriate power companies and heating oil and propane dealers were contacted and requested to supply consumption data for the 24 month period from January, 1977 to December, 1978. Utilizing this data, pre and post treatment comparisons between all three groups were possible. In only a handful of cases (involving heating oil dealers only) were records of such poor quality that this information could not be obtained.

Parents were also requested to supply consumption information, although it was not expected that many would take the time to do so. However, partial or total data was received from 10 families, and this was used to check the reliability of data received from power companies and dealers. It was found that the error rate was less than 3 percent, and in most cases, these sources differed by less than 10 KWH.

When data was obtained, it was divided into two categories, electricity and fuel used for space heating.

(1) Electricity. Electricity for all uses except space heating was placed in this category. Two families were excluded because they used electric heat, and this was included in their bill for all other electric uses. For the balance of the households, monthly kilowatt-hour (KWH) usage became the data for further analysis.

(2) Space Heating. Included in this category were heating oil, natural gas and propane gas used for space heating. Again, the two families using electric heat were excluded because lighting, etc., was included in their usage. In addition, another family was excluded because they switched from fuel oil to natural gas during the course of the study. Two other families were excluded because they heated solely with wood (this energy source was difficult to equate with the others). It should be noted that more than half the families listed some use of wood for heating, but this was not taken into account in this study.

In order to equate the different types of fuels, all data were converted into British Thermal Units (BTU) per unit of fuel by multiplying raw consumption data by the appropriate conversion factor as listed in Table 2. Temperature fluctuations were also taken into account by

Table 2.--Fuel Conversion Factors.*

Type of Fuel	Conversion Factor
Heating Oil	
Number 1	137,000 BTU/gallon
Number 2	139,600 BTU/gallon
Natural Gas	100,000 BTU/100 cubic feet
Propane Gas	91,500 BTU/gallon

*Note: Obtained from "Which Fuels to Use?", EES Energy Dispatch, Energy Administration, Michigan Department of Commerce, Lansing, Michigan.

equating all data for heating degree day (HDD). Information regarding HDD was obtained from the National Climatic Center is Asheville, North Carolina, from their publication entitled "Climatological Data." Data were utilized from five stations in the area of the study in order to provide the most accurate information for each household.

The final equation for the heating data was: Total BTUs per month/HDD.

Process Measures

Home Energy Conservation Survey (Appendix I). This measure was utilized to determine if there was any difference between the nature of the conservation activities of the three groups during the treatment month of the experiment. The questionnaire contained a list of 61 energy saving tasks that could be attempted around the home. These tasks were grouped into the categories of lighting, appliances, hot water, kitchen, space heating, and major. In essence, the Home Energy Conservation Survey was a modified version of the Residential Energy Saving Tips sheet (Appendix F3) given to students who attended the workshops and used specifically by the TO group during their energy conservation week. Spaces were provided on the questionnaire for separate recording of the conservation behaviors engaged in by the student, each of his/her parents, and siblings. Each of the above persons (e.g., student, mother, father, etc.) was asked to report how many times he or she had done each of the tasks during the previous month (April, 1978). Scores could range from zero to a limit of "three times or more." As noted, a separate index was formed for each of the family categories of youth, father, mother and siblings. For each of these categories, two dependent variables were created. First, each entry other than a zero was counted as 1, and a total was calculated for each family category. This measure was labeled "variety of tasks performed." Second, the actual recorded numbers were counted, and this was labeled "total number of times all tasks performed." Thus, the second measure constructed included repetitions of the same task.

Reliability analyses performed on each of these scales utilizing the second measure demonstrated high internal consistency. For each scale, the Cronbach *alpha* was .90 or greater.

The Home Energy Conservation Survey was used as a posttest measure for all three groups included in the experimental design. Students were given the questionnaire after completing the Youth Energy Survey, and they were allowed to take it home for completion.

Essay Questionnaire (Appendix J). This measure consisted of a series of questions designed to extract information regarding the extent to which students had attempted to involve other family members in the energy conservation week. In addition, this measure attempted to assess the methods students had used to do so. The purpose of this instrument was to obtain exploratory data which might be utilized in designing future studies. This measure was administered to the TO group, only, immediately after they had completed the Youth Energy Survey.

After reviewing the responses to these questions, two independent raters devised a set of categories relative to the methods used by TO students to get other family members to conserve. Eight categories were derived as follows: (1) supplied family with information about the energy problem, (2) gave family members specific energy saving tips, (3) reminded family members as they were using energy, (4) stressed money savings, (5) told family members it was a school/research project, (6) asked family members to save energy as a favor or bribed them, (7) gave a general reminder to save energy, and (8) did nothing. Incomplete responses were frequently made by subjects to question #2, and many of these responses were reiterations of the responses made by subjects to question #1. Therefore, responses to question #2 were discarded, and only the responses to question #1 were coded into the eight categories. The end result of this procedure was a frequency count which corresponded to the extent to which students employed each of the eight methods to involve their families in conservation activities.

Workshop Evaluation Form (Appendix E). This instrument was designed for two purposes. The first purpose was to provide evaluative feedback to those persons who conducted the workshops. More importantly, the second objective of this measure was to provide information concerning whether students in both the TO and INFO groups perceived and evaluated the workshops similarly.

The Workshop Evaluation form consisted of 12 questions concerning different components of the workshop. Responses to each item were taken from 5-point Likert-type scales. This measure was administered to students in the TO and INFO groups on the days of the workshops and just prior to their random assignment to the TO and INFO groups.

Descriptive Measure

Demographics Questionnaire (Appendix K). It was anticipated that certain demographic factors, such as education and income, might mediate the responses of students' families to the experimental treatment. An assessment of the literature yielded some support for this possibility (Olsen & Goodnight, Note; Kilkeary, Note 5; Rappeport & Labaw, Note 15). As a result, a demographic questionnaire was included with the utility company release forms which students in all three experimental conditions brought home to their parents. The items on this questionnaire assessed the education, occupation, and income of each students' parents. Because of the sensitive nature of these items, it was not expected that all families would return the form. However, 62 percent of the parents supplied some or all of the information requested.

Data from the demographics questionnaire was reduced for analysis in the following manner: Parents' education data was coded into one of three categories: (1) high school diploma or less, (2) bachelors degree or some college, or (3) graduate degree. Income data was combined for husband and wife into "family income" and coded into one of three categories: (1) zero to $15,000, (2) $15,001 to $30,000, or (3) over $30,000. Occupational data was not utilized because the unstructured nature of the item led to several responses which were too general to be interpretable or categorizable (e.g., clerk).

RESULTS

Manipulation Check Data

It will be recalled that students in the TO group were telephoned by the experimenter during the "baseline" week of their two-week energy conservation activity program. The purpose of this phone call was to offer assistance to students who were having difficulty reading meters or fuel oil gauges. In addition, the experimenter inquired if students had asked other family members for help with the project. No systematic data were recorded by the experimenter. However, the general impressions formed by the experimenter as a result of the phone calls to the 27 TO group students can be described. Most students reported that they had taken the first meter reading on the date prescribed in the instructions. However, approximately five students reported that they had not read their meters. Various reasons were given for this (e.g., the meter was covered by a layer of ice and snow and could not be read, or the student was away from home on the day assigned for the meter reading). However, all of the students who had failed to read their meters agreed to attempt to begin the project one week late. In addition, approximately one-half of the 27 TO students said that they had already talked to one or more members of their family about the "conservation" week. The rest of the students said that they planned to talk to their families before the "conservation" week began.

As an additional manipulation check, students in the TO group were asked to return to the experimenter by mail the "computation form" they completed during the two-week conservation activity program. Ten of the 27 students in the TO group returned these forms.

The 20 self-report items included on the Youth Energy Survey provided additional data for a check of the TO manipulation. Table A (in Appendix L) shows the results of chi-square analyses of these items. The analyses revealed that TO subjects were more likely than INFO or control group subjects to have engaged in the tasks specified in the TO homework assignment. The TO group students answered "yes" more often to each of the following questions: "In the past six months have your parents lowered the thermostat by three degrees or more?", $\chi^2(2) = 6.34$, $p < .04$; "In the past six months have you asked your parents to do any of the tasks listed above?", $\chi^2(2) = 11.26$, $p < .0036$; "In the past six months have you ridden home from school in a car with two or more other people?", $\chi^2(2) = 6.29$, $p < .04$; "In the past six months have you conserved energy in any other way?", $\chi^2(2) = 7.21$, $p < .03$. Note that, with one exception, the above items which revealed significant differences between the TO group and the remaining groups were those activities which were most similar to the activities which were assigned to the TO students. In contrast, for those activities not related to the TO assignment (e.g., the carpooling and busing items) only one item revealed significant differences between the TO students and the INFO or control group students. While not totally definitive, these data do provide some suggestive evidence that the TO assignments were carried out by students.

Outcome Measures

Youth Energy Survey

The Youth Energy Survey was used as a posttest only in the present study, and data were available on 83 subjects. A one-way analysis of variance was performed on the total scores yielded by the Youth Energy Survey. As indicated in Table 3, the analysis of variance revealed a significant difference between the groups, $F(2,79) = 8.01$, $p < .007$. A Scheffé test ($p < .05$) performed *post hoc* on these means indicated that consistent with the attitude change hypothesis, students in the TO group developed more extreme pro-energy conservation attitudes than students in either the INFO group or the control group. The latter two groups did not differ significantly. The relevant means are depicted in Table 4.

Even though the primary attitudinal outcome measure was a total score on the Youth Energy Survey, additional

Table 3.--Analysis of Variance of Posttest Data of Youth Energy Survey (Total Scale).

Source of Variation	Sum of Squares	df	Mean Squares	F
Between Groups	2.2431	2	1.1215	8.0086*
Within Groups	11.0633	79	.1400	
Total	13.3064	81		

*p < .0007.

Table 4.--Group Means for Posttest Administration of Youth Energy Survey (Total Scale).

	Means
TO Group	4.02[a]
INFO Group	3.75[b]
CON Group	3.63[b]

Means not sharing a common superscript differ at the $p < .05$ level following the application of the Scheffé test. Higher means indicate more extreme pro-conservation attitudes.

analyses were performed on the subscales which comprise the total scale. One-way analyses of variance performed on each of the eight subscales revealed significant differences between the groups on five of these subscales. Tables B-I (in Appendix L) depict the analysis of variance summary tables as well as the relevant means. The significant subscales included: (a) general willingness to sacrifice to conserve energy, $F(2,80) = 7.22$, $p < .001$; (b) willingness to take specific energy conservation actions, $F(2,80) = 9.05$, $p < .0003$; (c) home heating related energy conservation, $F(2,80) = 7.93$, $p < .0007$; (d) government involvement in general in energy conservation, $F(2,80) = 5.40$, $p < .006$; and (3) energy conservation is important, $F(2,79) = 3.08$, $p < .05$. The scales not reaching a conventional level of significance included (f) taxes and energy conservation; (g) energy conservation is feasible; and (g) automobile related energy conservation.

Energy Consumption Behaviors

It will be recalled that energy consumption was subdivided into the categories of electricity use (exclusive of heat) and fuel used for space heating (excluding electricity). Each of these behavioral categories were analyzed separately.

Electricity Consumption. The electricity data collected for each household consisted of monthly KWH usage levels for the 24 month period from January, 1977, to

December, 1978. In order to determine whether there were any differences between the treatment groups prior to the initiation of the experiment, one-way analyses of variance were performed on the monthly KWH totals for households for each of the 15 months beginning in January, 1977, and ending in March, 1978. No significant differences resulted from these analyses (see Table 5). Nevertheless, a definite trend is present in the table of means pictured in Table 6. As that table shows, the INFO group was the largest user of electricity for all 24 months.

A similar analysis was performed for the month of the treatment, April, 1978, and for the eight months thereafter. As can be seen from Table 5, significant differences between the treatment groups occurred for the months of April and October, 1978. Tables 7 and 8 show the analysis of variance summary tables, and Table 6 again shows the relevant means. Table 5 also reveals that there was a marginally significant tendency ($p < .10$) for the groups to differ in their consumption for the months of January, July, August, September, and November. The pattern of means for each of these months is similar to the pattern revealed for the months of April and October. A *post hoc* Scheffé test ($p < .05$) performed on the consumption levels for the months of April and October revealed a significant difference between the TO group and the INFO group. However, no significant differences were found between the control group and either of the other two groups.

Table 5.--Omnibus F Ratios and Probability Values for Analyses of Variance of Monthly Electricity Consumption Data.

	1977		1978	
	F Ratio	*F* Probability	*F* Ratio	*F* Probability
January	1.7150	.1902	2.4937	.0921
February	1.0911	.3435	1.0456	.3585
March	2.0052	.1451	1.9091	.1581
April	2.4172	.0993	3.2528	.0464
May	1.8144	.1731	2.0676	.1364
June	1.3686	.2635	1.4942	.2336
July	1.5330	.2255	2.3878	.1016
August	2.6022	.0836	3.0217	.0572
September	1.9980	.1457	2.3665	.1037
October	2.8914	.0643	3.9192	.0259
November	1.0240	.3661	2.7736	.0717
December	1.6727	.1973	1.5494	.2220

Table 6.--Mean Monthly Electricity Consumption (in KWH).

	TO Group		INFO Group		CON Group	
	1977	1978	1977	1978	1977	1978
January	840	754	1224	1163	918	902
February	755	728	1025	954	834	848
March	709	713	1082	1006	824	817
April	605	583	918	910	755	763
May	610	596	861	837	734	765
June	591	575	784	769	687	687
July	578	529	775	758	664	684
August	576	538	838	790	679	692
September	633	564	873	785	692	688
October	617	582	963	894	765	718
November	741	647	951	941	799	768
December	794	749	1101	1002	862	839

Note: Higher means indicate greater levels of consumption.

Table 7.--Analysis of Variance of Electricity Consumption Data for April, 1978.

Source of Variation	Sum of Squares	df	Mean Squares	F
Between Groups	888145	2	444072	3.2528*
Within Groups	7372127	54	136520	
Total	8260272	56		

*p < .0464.

Table 8.--Analysis of Variance of Electricity Consumption Data for October, 1978.

Source of Variation	Sum of Squares	df	Mean Squares	F
Between Groups	786440	2	393220	3.9192*
Within Groups	5317617	53	100332	
Total	6104057	55		

*p < .0259.

Given that there was a distinct tendency for the INFO group to differ from the TO group in electricity consumption prior to the introduction of the experimental treatment, an analysis of covariance was applied to the means for the months of April and October. When 1977 prior consumption was covaried out, the significant effects described above were lost. The adjusted means are shown in Table 9, and Tables 10 and 11 depict the analysis of covariance summary tables.

Table 9.--Adjusted Mean Monthly Electricity Consumption (in KWH).

	April, 1978	October, 1978
TO Group	725	706
INFO Group	772	753
CON Group	774	722

To further elucidate changes in consumption, difference scores were formed for each household for each of the 12 months of the year by subtracting the 1978 usage of households from their 1977 electricity usage levels (e.g., Difference 1 = January, 1977 minus January, 1978). Thus, a positive difference would indicate that less energy was used for that month in 1978, and vice versa.

One-way analyses of variance performed on the 12 change scores (see Table J) revealed no significant

Table 10.--Analysis of Variance and Covariance of Electricity Consumption Data for April, 1978.

Source of Variation	Sum of Squares	df	Mean Squares	F
Covariates April, 1977	7429741.86	1	7429741.86	530.32*
Main Effects	24787.81	2	12393.91	.885
Residual	700494.65	50	14009.89	
Total	8155024.32	53		

*p < .001.

Table 11.--Analysis of Variance and Covariance of Electricity Consumption Data for October, 1978.

Source of Variation	Sum of Squares	df	Mean Squares	F
Covariates October, 1977	5252773.62	1	5252773.62	337.27*
Main Effects	15635.93	2	7817.96	.502
Residual	794285.84	51	15574.23	
Total	6062695.38	54		

*p < .001.

treatment differences. From Table K, However, it can be seen that the INFO group often saved the most electricity.

Fuel Oil, Natural Gas and Propane Consumption. It will be recalled that the equation used to compute monthly usage was as follows: Total BTUs per month/HDD. A one-way analysis of variance was performed on each of the 24 months of space heating data. No significant differences were found to exist between the groups for any month. Mean monthly usage is depicted in Table L. Omnibus F ratios and probability values are shown in Table M.

Difference scores were again created for each of the 12 months by subtracting 1978 levels of consumption from 1977 consumption levels. A series of one-way analyses of variance were performed on the difference scores for each month, but again, no significant differences emerged from these analyses. The means are depicted in Table N. The omnibus F ratios and probability values are reported in Table O.

Process Measures

Home Energy Conservation Survey

Recall that the Home Energy Conservation Survey was used as a post-treatment measure to assess the energy conservation activities of students and their families. As a result of some attrition, data were available on 66 of the original 84 subjects who participated in the experiment.

As described earlier, two main indices were calculated for each of the four scales (youth, father, mother, and siblings) comprising the questionnaire. These measures were (a) variety of conservation tasks performed in the home and (b) total number of times all conservation tasks performed. These indices were constructed for each of the four types of family members. In addition, family scores were computed for each of the indices by combining individual family member scores to form a single score for the entire family.

A series of five one-way analyses of variance were performed on the variety of tasks performed index. These analyses revealed no significant differences between the treatment groups when the family members' scores were considered singly or when they were considered collectively. Similar analyses were performed on the total number of tasks performed index. Again, no significant differences emerged. Means are reported in Table P, and F ratios and probability values are depicted in Table Q.

Scores for the two indices were then considered in a two-way analysis of variance (3 X 4) where the independent variables were treatment group (TO, INFO, or CON) and family member (youth, father, mother, or siblings). The results of these analyses revealed a main effect for family member on both the variety of task performed index, $F(3,248) = 25.20$, $p < .001$, and the total number of tasks performed index, $F(3,248) = 34.32$, $p < .001$. *Post hoc* Scheffé tests ($p < .05$) performed on both the variety and total indices revealed a significant difference between the mother and other family members. However, no other significant differences were found. The means from these analyses are shown in Table R, and the analysis of variance summary tables are reported in Table S.

Workshop Evaluation

A Workshop Evaluation questionnaire was administered to the TO and INFO groups at the end of each of the treatment workshops. Responses obtained from both workshops were combined and the TO and INFO groups were compared.

T-tests were performed on each of the 12 items on the questionnaire. A significant difference between the TO and INFO groups emerged on only one item, $t(47) = 1.99$, $p < .053$. The item related to subjects' perceptions of whether or not the objectives of the workshop had been met (see Table T). TO subjects indicated more than the INFO subjects that the objectives of the workshop had been met.

Essay Questionnaire

It will be recalled that data from the essay questionnaire was coded into the following eight categories of methods used by students to influence their family to conserve energy: (1) gave them information about the energy problem, (b) told them about specific energy saving things to do, (c) reminded or "bugged" them as they were using energy, (d) stressed dollar savings, (e) told them it was a school/research project, (f) asked them to do it as a favor or bribed them, (g) gave general reminders to save energy, and (h) have not tried to get them to save energy. A chi-square test performed on these data revealed no significant differences between the categories, $\chi^2(7) = 6.26$, n.s. Category frequencies are reported in Table U.

Descriptive Measures

Demographic Information

As described earlier, data were gathered regarding family income, father's education, and mother's education. The data for each of these demographic variables were coded into one of three categories. For the income variable, the categories were (1) zero to $15,000, (2) $15,001 to $30,000, or (3) over $30,000. The categories for the education variable were (1) high school diploma or less, (2) bachelors degree or some college, or (3) graduate degree. These variables were analyzed along with the treatment variable in a series of 3 X 3 analyses of variance, with the various outcome measures (e.g., total attitude scale, electricity usage, and space heating usage) serving as dependent variables. Several results emerged from these analyses as can be seen in Table V.

For the total attitude scale, there were no main effects for the demographic variables, and no interaction effects.

When the 12 months of electricity data for 1978 were analyzed, there were significant differences across family income conditions for six of those months. A comparison of the means revealed that, in January, February, and December, the mean electricity usage of the high income group was greater than either of the other two income groups. However, during March, June, and July, the high income group's mean usage was greater than the middle income group, only. There were no significant main effects for education.

For the 1978 space heating data, there were main effects for family income for 11 months (all except November). For eight of those months (January, February, March, April, June, September, October, and December) the high income group once again had a higher mean energy usage than either of the other two groups. For the remaining three months, however, the over $30,000 group's mean energy usage was greater than the low income group, only. There were also main effects for the education variables. In families where the father had a graduate degree, the mean energy usage was higher than in either of the other education groups for the months of January through March. However, for the month of April, the graduate degree group's mean energy usage was greater than the high school diploma group, only. These findings are in accordance with the income effects, assuming that income goes up with more education. Again, there were no main effects for mother's education.

For electricity difference scores, there were significant main effects for family income for three months. During October and November, the mean electricity saving of the high income group was greater than either of the other two groups. During May, the high income group's mean saving was greater than the medium income group, only. For electricity difference scores, the only other main effect was for father's education. During November, the mean electricity saving of the graduate degree group was greater than either of the other education groups.

With heating difference scores, there was a significant main effect for family income for the month of May, only. For that month, a comparison of group means showed that the high income group tended to save more energy than the low income group, only. In addition, there were several main effects for both mother's and father's education. For the mother's education variable,[2] a comparison of the means indicated that the college education group saved more energy than the high school diploma group. This occurred during the months of August and October. For father's education, four months were significant. However, there was no consistent pattern for those months. A comparison of the means revealed that, during July, the graduate degree group saved more energy than either of the other two groups. However, during May and November, the graduate degree group saved more than the high school diploma group, only. During June, the graduate degree group saved more than the college education group, only.

Finally, there were several interaction effects. For monthly electricity usage, an interaction occurred with the treatment and mother's education for the month of December. An analysis of the simple effects contributing to this interaction revealed that the interaction was due to differential use of energy by differing education groups within the TO group. The pattern of this simple effect suggested that the higher education group tended to use more energy than the lower education group. The simple effects of education within the INFO and control groups were not significant.

For monthly heating usage, there were interactions for two months with family income. An analysis of the simple effects contributing to this interaction for the month of June indicated that the interaction was due to varied use of heating by the different income groups within the INFO and control conditions. For the month of July, the simple effects analysis was significant for the INFO group only. The pattern of these simple effects suggested that families with higher income utilized greater amounts of energy than did the middle income group or the low income group. The simple effects of income within the TO group were not significant for either month.

When electricity difference scores were considered, there was an interaction for the month of April with mother's education. A simple effects analysis revealed that the interaction was due to a difference in the amount of energy saved by the various education groups within the TO condition. The tendency was for those with a college education to save more energy than the high school diploma group. The simple effects of the INFO and control groups were not significant. In addition, there was also an interaction with family income during March and December. Simple effects analyses revealed that the interaction was due to a differential tendency by the low, medium and high income groups to save energy in the INFO condition. The pattern of means showed that the high income group saved the most energy, and the low income group saved the least.

Only one interaction occurred with heating difference scores, and that was for the month of April with father's education. Simple effects analyses were significant for all three groups (TO, INFO and control). However, the pattern of mean savings differed greatly within the groups according to level of education. In the TO condition, the high diploma group saved the most energy, and the graduate degree group saved the least. In the INFO condition, the high school diploma group again saved the most, but the college education group saved the least. In the control group, the graduate degree group saved the most, while the high school diploma group saved the least.

Relationship Between Process Measures and Outcome Measures

To assess possible relationships between process measures and the significant outcome measures, a set of Pearson Product Moment Correlations were performed on these data. Table 12 shows the correlations between process

Table 12.--Pearson Product Moment Correlations--Process Measures and Outcome Measures.

	Total Scale	Electricity April, 1978	EElectricity October, 1978
Number of Family Cars		.32	.31
Youth Owns a Car 1 = yes 2 = no	.23		
Youth Energy Survey:			
Question #68: Asked your parents to do any of the tasks listed above.	-.39		
Question #74: Ridden home from school in a bus over ten times	-.23		
Question #80: Conserved energy in any other way		-.28	-.33

*p < .05.

measures and the significant outcome measures which were significant beyond the $p < .05$ level. The following relationships should be noted. First, the number of cars a family owned was positively correlated with energy usage levels. Second, those persons who tended to solicit the participation of their parents in the present project were those persons who held the most pro-conservation attitudes as measured by the Youth Energy Survey. Finally, those persons who consumed the most energy were more likely to report that they had not performed the various specific tasks associated with conservation, but ràther, tended to report that they conserved energy in other ways.

DISCUSSION

The most important result to emerge from the present research was that students who received an energy education workshop, and later, participated in a home energy conservation activity program, developed attitudes which were significantly more pro-conservation than students who attended an energy education workshop only. Equally as important was the result that those students who participated in the traditional, passive information-based, energy education workshop exhibited no greater levels of attitude change than those exhibited by a no-treatment control group. Certainly, this pattern of results seriously challenges the notion that mere exposure to energy conservation information will lead to changes in values and/or attitudes which favor energy conservation among senior youth. Contrary to the latter perspective, the present findings provide support for the attitude change theories of Bem (1970) and Breer and Locke (1965), i.e., that task experience serves as the most compelling source of attitude change. In addition, these results concur with the philosophical perspectives of educators such as Dewey (1952) and Holt (1976) who hold that students learn more effectively through experience than through passive exposure to persuasive communication or traditional educative materials.

While the results of the present study indicate that information by itself is not sufficient to induce changes in energy related attitudes, the exact function that information does perform is unclear from the present study. It may be, for instance, that the information component of the TO manipulation was essential in that it provided students with background information on the energy problem and its severity. Without this information, students in the TO group may not have been as motivated to participate in the energy conservation activity program. Establishing the appropriate role of information remains an important research question for energy education researchers.

The results obtained on the primary behavioral indicators of energy conservation (household consumption of electricity and fuel oil/natural gas) suggested that, contrary to the hypotheses of the experiment, attitudes were not translated into behaviors in the present study. More specifically, the energy consumption levels of households containing a TO student did not differ significantly from the consumption levels of households where INFO and control group students resided. While it appeared from an initial analysis that electricity usage differed between the TO and INFO groups for the months of April (the treatment month) and October, subsequent analyses (an analysis of covariance) indicated that this difference was an artifact of prior differences characterizing the treatment groups.

The lack of a relationship between attitudes and behavior in the present study is totally consistent with the work of Wicker (1969). Recall that Wicker's review of the literature and his experimental work suggests that attitudes are related to behavior very infrequently. Of course, it could be argued cogently that perhaps it was unrealistic to expect that the activities of one high school student would be reflected in altered household energy consumption levels. However, even if this was the case, stronger behavioral differences should have emerged between TO and INFO youth on the process measures. For example, the Home Energy Conservation Survey attempted to assess the actual conservation behaviors pursued by the youth, siblings, mothers, and fathers. This measure also revealed no behavioral differences between youth who held differing attitudes toward conservation. The process/outcome correlative data suggested that virtually the only behavioral difference between the students who held differing attitudes towards conservation was that the most pro-conservation students were more likely to have said that they asked their parents to assist them in conserving energy. In other words, students in the TO group did attempt to obtain the cooperation of their parents. Apparently, however, even though parents of youth holding highly pro-conservation attitudes were more likely to be approached, they did little in the way of actively pursuing conservation around the home. For this reason, household energy consumption levels did not differ across the experimental conditions, and further, parents or family members did not become differentially involved in conservation activities (Home Energy Conservation Survey data) as a function of experimental manipulation. It is this latter linkage, or that linkage between parents and senior youth which requires greater exploration. Perhaps if TO students had been given some suggestions or added information regarding how to influence others in their families to conserve energy, and if more time had been allowed for this to occur, the treatment would have been strengthened and behavioral differences on the household consumption measures and process measures would have emerged. These objectives will be discussed in more detail in a section which will focus on future research directions.

In an exploratory sense, the various process measures utilized in the present study provided an additional set of noteworthy findings. For instance, the data from the Home Energy Conservation Survey revealed that mothers performed more conservation tasks than any other family member. However, it should be noted that mothers did not perform more of these activities as a function of the TO manipulation. One obvious reason that mothers perform more energy conservation tasks could be that the majority of the tasks listed on the survey form were those tasks which are traditionally designated as female tasks, i.e., laundry, food preparation, and dishwashing. Thus, it could be that mothers had more opportunities to conserve than other family members, and these results may just be a confirmation of the traditional female role. It should also be noted that almost half of those mothers who supplied employment information indicated that they were employed full time. Therefore, the above results are not restricted to nonworking mothers. Aside from the conceptual implications of these results, in a practical sense these results suggest that mothers may be an important target for future energy education interventions. Future research with youth might seek to exploit this youth-mother linkage through the development of curriculum materials which will encourage interaction and collaboration between the youth and the manager of the household. Alternatively, household conservation interventions might be specifically targeted to household members who are responsible for household maintenance, laundry, and meal preparation tasks.

The above speculations, however, should be tempered with the possibility that some methodological problems may have characterized the Home Energy Conservation Survey. The instrument was not pilot-tested, and some problems developed with its use. Students reported that the form was difficult and time consuming to complete. In particular, special problems occurred in families with many children, as in some cases it was necessary for the student to compute an average score for the actions of five or six brothers and sisters for the category "sibling." In addition, since all the family members answered on the same form, any family member's answers could have been biased by previous answers already appearing. Another problem was imposed by limiting responses to items to "three times or more." This limitation might have led to a restriction of range on certain items which may have been responsible for the failure to find treatment differences. In future studies, a modified version of the Home Energy Conservation Survey should be employed. Each family member should be given a separate form to complete, and the actual number of times a task has been completed should not be constrained by the imposition of a specific response ceiling.

One final point should be made with regard to the use of the Home Energy Conservation Survey. It was discovered in telephone conversations with some of the INFO group mothers after the experiment was concluded that completion of the Home Energy Conservation Survey as a post-test measure alerted them to several energy conservation measures they and their families could institute. The provision of this information would have the effect of tending to dissipate any differences between the treatment groups in their level of energy usage, which continued to be monitored for another eight months after completion of the survey form. Thus, the provision of conservation prompts via the Home Energy Conservation Survey may have been another factor leading to the failure to find a treatment effect for energy usage.

One unexpected process result of the present study occurred on the workshop evaluation questionnaire. No differences in responses by the TO and INFO groups to this questionnaire were expected since both groups attended the same workshops. However, these groups were found to differ on one item. The item requested students to indicate the extent to which they felt that the objectives of the workshop had been met. The mean response of the TO group was 3.96 (approaching "more than adequately met), and the mean of the INFO group was 3.44 (halfway between "adequately met" and "more than adequately met"). Since 15 *t*-tests were performed on the analysis of this particular questionnaire, this one significant difference could be spurious. In any event, since both groups perceived the objectives of the workshop as being at least "adequately met," this result does not cause concern.

The final process measure which revealed some very interesting trends was the demographic data and their relationships to the outcome measures. It was found that higher income was almost always associated with greater energy usage in the winter and in some summer months. This occurred with both the electricity and natural gas/fuel oil consumption indices. This result seems to suggest that those who can afford it will use more energy. However, there was also some indication that the high income groups tended to save more energy in 1978 (when compared to 1977 usage levels) than low income groups. Considering that these families were higher users to begin with, they may have had more available waste to cut back on, and hence, could save without any real sacrifice or change in lifestyle. The low income group, on the other hand, may already have been conserving (they were lower users to begin with), and to further reduce usage may have posed considerable hardship for these families.

The primary rationale for collecting the demographic information was to assess the possible relationships between demographic variables and the TO and INFO manipulations, e.g., whether the high income group was behaving differentially as a function of the TO and INFO manipulations. The results suggested that there were some differential responses to the experimental treatments among differing types of families. During the treatment month of April, students' households with college educated mothers in the TO group were found to save more electricity than households where the mother had a high school education. There were no analogous differences in the INFO or control groups. Since many of the students in the TO group regarded the energy conservation activity program as a homework assignment, it could be that college educated mothers were more responsive to their children's homework. Hence, they may have become involved in conservation activities.

While there is some evidence that household electricity usage may be the domain of mothers, it appears that heating usage is the domain of fathers. It was found that father's education interacted with the treatment for the month of April when the dependent measure was savings in heating usage. Specifically, in the TO and INFO groups, households in which the father had only a high school education were more likely to conserve natural gas/fuel oil than households in which the father had a graduate degree of some type. This result is difficult to explain, but perhaps high school educated fathers were more accessible to students than fathers with higher degrees. In any event, the recommendation made above that interventions aimed at energy conservation in the home be directed at mothers should be modified to reflect this additional information. Perhaps, to achieve the best results, these interventions should be two-pronged. Specifically, interventions should be directed to mothers in order to reduce electricity usage and to fathers in order to reduce heating usage. Of course, this suggestion should be viewed as extremely tentative pending further empirical research.

In conclusion, the present study suggests that a task-oriented approach to energy education is the most effective means of changing or imparting to high school students the appropriate attitudes concerning energy conservation. Further, the present study also suggests that a passive, information dissemination approach to energy education may be totally ineffective as a vehicle for changing energy conservation attitudes. Finally, and perhaps most importantly, these results do not provide any evidence that changes in energy conservation attitudes result in corresponding changes in behavior. Of course, these results cannot be generalized to high school students in other areas of the country or to other climates without further empirical work. In addition, it is not known if these results would occur with students at lower grade levels. It is clear that much additional research will be necessary to establish the generalizability and validity of these results.

After completion of the present study, the forms and instructions utilized in the energy conservation activity program were incorporated into a curriculum package for use by teachers (Leedom, Note 16). Future studies of the task-oriented approach to energy education should examine the effectiveness of this method under the direction of a teacher and for longer time periods. In a classroom setting, students could work in groups, along with the teacher, in planning long-term interactional strategies to convince their families to conserve energy. The teacher would have a greater opportunity to provide assistance and monitor behavioral progress than did the experimenter in the present study. For instance, students could bring weekly meter readings into class. These meter readings could be used to identify specific tasks which resulted in energy savings.

The meter readings could also be used to identify family interaction building strategies that worked to coordinate the family, and hence save energy. In this way, students would have the opportunity to benefit from the experiences of peers. Furthermore, if they did not succeed in conserving energy and obtaining family cooperation initially, they would have the opportunity to modify their strategies and try again. Most importantly, however, this setting would provide the maximum potential for peer reinforcement of behavioral changes affected by the student and his family.

If both the classroom and the activity components of the task-oriented approach to energy education were improved as recommended above, this approach might prove to be more effective as an energy conservation intervention.

APPENDICES

APPENDIX A

PRINTED MATERIALS SUPPLIED IN INFORMATION PACKET

APPENDIX A

PRINTED MATERIALS SUPPLIED IN

INFORMATION PACKET

"Save Energy: Save Money!", CSA pamphlet 6143-5, published by Community Services Administration, Washington, D.C., August, 1977.

"Energy: nature of energy; energy sources; energy uses; energy demand; energy recovery and conservation," published by Michigan United Conservation Clubs, P.O. Box 30235, Lansing, MI.

"Where Houses Lose Heat," Energy Fact Sheet No. 19, Extension Bulletin E-1193, published by Cooperative Extension Service, Michigan State University, East Lansing, MI, January, 1978.

"Low Cost Weatherproofing," Extension Bulletin E-1196, published by Cooperative Extension Service and Family Living Education in cooperation with the Agricultural Engineering Department, Michigan State University, East Lansing, MI.

"Weatherproofing Michigan Houses," Extension Bulletin E-813, published by the Cooperative Extension Service in cooperation with the Departments of Human Environment and Design, Agricultural Engineering and Urban Planning and Landscape Architecture, Michigan State University, East Lansing, MI.

"Insulate Your Unfinished Attic," Extension Bulletin 1103; "Weatherstrip Your Doors and Windows," Extension Bulletin 1104; "Insulate Your Basement Walls," Extension Bulletin 1105; all part of the "In the Bank or Up the Chimney" series published by the Cooperative Extension Service, Michigan State University, East Lansing, MI.

Pamphlet on demonstration techniques, public speaking techniques, skits and graphics, published by the 4-H Youth Programs, Cooperative Extension Service, Michigan State University, East Lansing, MI.

Energy charts and graphs obtained from various sources.

Instructions on "How to Read an Electric Meter and Gas Meter" (see Appendix E-2).

"Residential Energy Saving Tips (see Appendix E-3).

APPENDIX B

WORKSHOP AGENDA

APPENDIX B

WORKSHOP AGENDA

8:30 - 9:00 a.m.	Registration and welcome speech. Note: Participants pick up packet of energy information.
9:00 - 10:00 a.m.	Group activity designed to enhance interaction among those present and also demonstrate presentation techniques and increase awareness of energy use.
10:00 - 12:00 noon	Presentation of information on various forms of energy, supply and demand, and the need to use energy wisely (lecture and two films).
12:00 - 1:00 p.m.	Lunch
1:00 - 3:30 p.m.	Values clarification exercise contrasting beliefs and actions; presentation of various topics to assist in making an energy conservation pitch to others, including brainstorming, public speaking and demonstration techniques.
3:30 - 4:00 p.m.	Completion of workshop evaluation forms. Entire group is asked to participate in an experiment. Release forms are handed out.
4:00 - 4:30 p.m.	Randomly assign students to TO or INFO groups. INFO group participates in energy related activity. TO group goes into a separate room to receive special assignment.

APPENDIX C

LETTER EXPLAINING PURPOSE OF STUDY

COOPERATIVE EXTENSION SERVICE

MICHIGAN STATE UNIVERSITY and

U.S. DEPARTMENT OF AGRICULTURE COOPERATING

UPPER PENINSULA EXTENSION CENTER 1850 PRESQUE ISLE · MARQUETTE · MICHIGAN · 49855

April 1, 1978

Dear Parents:

Your son/daughter has agreed to participate in a study of energy usage by households being conducted by the Energy Extension Service of the Michigan Energy Administration. Participation in this study means that in about one month your son/daughter will be asked to fill out a questionnaire concerned with energy attitudes.

In addition, we would like to ask for your permission to monitor the amount of energy your household has used each month from January, 1977 until December, 1978. If you agree to this, please sign the enclosed form entitled "Permission to Release Energy Consumption Information" and return it in the envelope provided. If you will also complete and return the attached "Home Energy Survey," we will then be able to contact the appropriate utilities and dealers for the information we need.

Please note that the release form only entitles us to information regarding the amount of energy used, and not your billing record. Also, we assure you that any information obtained will be held strictly confidential.

If you would like to assist us further (and if you have retained any prior electricity bills) on a separate sheet of paper list the "billing period" and "KWH used" for each electric bill that you have as far back as January, 1977. (If you can locate these bills, perhaps your son/daughter could copy the information we need from them.) This would save considerable time and expense on the part of the utility company in searching for back records. In any event, you should still sign and return the release so that we can continue to obtain your electricity usage information through December, 1978, and also obtain the other information we need (for example, natural gas or fuel oil usage).

This study will help us to learn more about energy usage patterns of Upper Peninsula households. The results will be used to plan energy education programs for high school students. It is important that we obtain this information for each household in the study. Therefore, we sincerely hope that we will have your cooperation. If you have any questions, please feel free to call me at 226-3508. If I am not in, leave your name and phone number, and I will return the call as soon as possible.

Thank you very much.

Very truly yours,

Nancy J. Leedom
Energy Extension Service

Encs.

APPENDIX D

UTILITY COMPANY RELEASE

PERMISSION TO RELEASE ENERGY CONSUMPTION INFORMATION

I hereby authorize the release of information to Energy Extension Service representative, Nancy Leedom, on the amount of electricity, fuel oil, natural or other gas consumed by this household from January, 1977 through December, 1978.

Date__________________ Signed____________________________

Household address:____

*A photocopy of this authorization may be accepted with the same authority as the original.

APPENDIX E

WORKSHOP EVALUATION QUESTIONNAIRE

YOUR NAME_______________________

ENERGY AWARENESS TEAM WORKSHOP
EVALUATION FORM

Instructions: Please place the appropriate number in the box.

GENERAL

1. As an overall experience, I would rate this workshop as:

☐

5 = Extremely valuable
4 = Very valuable
3 = Valuable
2 = Somewhat valuable
1 = A waste of time

2. In general, I thought this workshop was:

☐

5 = Much more valuable than what I expected
4 = A little more valuable than what I expected
3 = About as valuable as what I expected
2 = A little less valuable than what I expected
1 = Much less valuable than what I expected

3. The objectives of the workshop were:

☐

5 = Stated clearly
4 = Stated somewhat
3 = Not stated at all
2 = Stated in a somewhat confusing manner
1 = Stated in an extremely confusing manner

4. The objectives of the workshop were:

☐

5 = Completely met
4 = More than adequately met
3 = Adequately met
2 = Somewhat met
1 = Not met at all

WORKSHOP FORMAT

5. The amount of time used during the program for:

Lectures	Audio-Visual Presentations	Discussion and Questions
☐	☐	☐

5 = Way too much
4 = Too much
3 = About right
2 = Too little
1 = Way too little

PRINTED MATERIALS

6. The amount of printed material provided:

☐
5 = Too much
4 = A little too much
3 = About right
2 = Not quite enough
1 = Not enough

7. In general, the content of the printed materials was:

☐
5 = Extremely useful
4 = Very useful
3 = Useful
2 = Somewhat useful
1 = Useless

INSTRUCTOR EFFECTIVENESS

8. In general, the practicality of the instructors' presentations was:

☐
5 = Very practical
4 = Usually practical
3 = Sometimes practical but sometimes too theoretical
2 = Usually too theoretical
1 = Very theoretical

9. Sensitivity to confusion (instructors would ask if anyone was confused at the end of a session):

☐
5 = Always
4 = Usually
3 = Occasionally
2 = Seldom
1 = Never

10. Organization:

☐
5 = Very well organized
4 = Well organized
3 = Fairly well organized
2 = A little disorganized
1 = Very disorganized

11. Group participation:

☐
5 = Always encouraged group to participate in discussion
4 = Usually encouraged group to participate
3 = Occasionally encouraged group to participate
2 = Seldom encouraged participation
1 = Never encouraged participation

12. Patience:

☐
5 = Always patient
4 = Usually patient
3 = Sometimes patient but sometimes impatient
2 = Usually impatient
1 = Almost always impatient

13. ADDITIONAL COMMENTS:

Please indicate below any additional positive or negative impressions of the program.

APPENDIX F1

INSTRUCTIONS FOR ENERGY CONSERVATION ACTIVITY PROGRAM

INSTRUCTIONS

1. This Saturday, April 8, you should take a reading of your electric meter and natural gas meter (if you have one). These readings can be recorded directly onto the attached forms headed "Electricity" and "Natural Gas." These are the forms with meter dials on them. If your home uses fuel oil for heat, you should check the gauge and write down how much fuel is in the tank. If you use another fuel, such as propane, try to find some way to measure how much is on hand as of this Saturday.

2. For the week that follows this meter reading, you should institute <u>no</u> <u>new</u> energy conservation actions. You can continue to practice those which are already in effect.

3. Then, on Saturday, April 15, you should again read all the same meters and gauges and record the data on the same forms. This should be done at the same time of day that you read the meters on the previous Saturday. Also, on this Saturday, you should use the "Residential Energy Saving Tips" form supplied to you. Go through the list and implement as many things as you can to save energy. Review the list every day and continue to save as much energy as you can until the next Saturday (April 22). Don't be limited to those ideas suggested on the sheet. If you can think of more ideas, do them.

4. On Saturday, April 22, take the final reading of all your meters and gauges. Again, this should be done at the same time of day as the previous two readings. At this point, it is up to you whether you want to continue your energy conservation program.

5. Next, complete the "Computation Form" for each type of energy used in your house. Transfer the meter and gauge data from the recording sheets onto these computation forms. You can now compute the savings from your energy conservation program.

6. Return the "Computation Forms" in the envelope provided.

APPENDIX F2

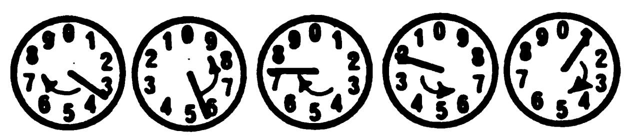
HOW TO READ AN ELECTRIC/NATURAL GAS METER

HOW TO READ AN ELECTRIC METER

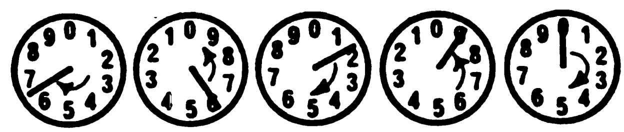
Your electric meter is an extremely accurate measuring instrument. It can be read very easily. Each dial represents a single number in the reading.

Most electric meters have five dials which are read from right to left: the dial on the far right indicates kilowatt-hours; the next dial, tens of kilowatt-hours; then hundreds; and so on. But the dials alternately rotate clockwise and counterclockwise.

Study the illustrations below. If an arrow points between 2 numbers, take the lower number, but if the arrow points between 9 and 0, read this as 9.



READING=35721



READING=66190

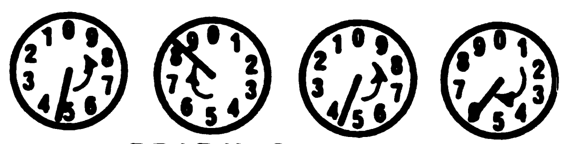
*For your information, a kilowatt-hour is 1000 watts of electricity used for a period of one hour. If you burn a 100 watt bulb for 10 hours, this equals one kilowatt-hour (100 watts X 10 hours = 1000 watts).

HOW TO READ A GAS METER

The dials of a gas meter are much like that of an electric meter except that there are usually only four dials. On the rightmost dial, the markings represent 100 cubic feet. Therefore, the needle on the rightmost dial goes around once for every 1000 cubic feet of gas used.

Note that the dials alternately rotate clockwise and counter-clockwise.

Study the illustration below.



READING=4846

This reading represents 484,600 cubic feet of gas.

APPENDIX F3

RESIDENTIAL ENERGY SAVING TIPS

RESIDENTIAL ENERGY SAVING TIPS

LIGHTING

- Turn off incandescent lights if you're leaving a room for 3 minutes or more. turn off fluorescent lamps if you're leaving a room for 15 minutes.

- Use bulbs of lower wattage in halls, stairways and other areas of general illumination.

- Keep lighting fixtures clean.

- In an area where a lot of light is needed, one large bulb is more efficient than several small ones. Fluorescent is even better.

- Fluorescent bulbs of 40 watts produce as much light as incandescent bulbs of 100 watts, and at half the energy cost with 10 times the life. Consider replacing incandescent lighting with fluorescent in some areas.

APPLIANCES

- Don't leave the TV set, radio or stereo on when no one is interested.

- TV sets with the "instant on" feature use energy constantly so unplug when not in use.

- Don't overload or underload your clothes dryer—each reduces your dryer's efficiency. Remember to clean the lint filter after each use as collected lint cuts efficiency.

- Don't overdry clothes in the dryer. It uses more energy, and some fabrics become hard to iron if the wrinkles dry in.

- Dry consecutive loads to avoid reheating the element once the dryer is warmed up.

- Line dry garments and household items whenever possible.

- Do your ironing in larger batches and reduce the number of times you have to warm up the iron during the week.

HOT WATER

- Set the water heater temperature between 120°F and 140°.

- Drain a pail of water from the bottom of your hot water tank monthly. This removes the sediment and improves efficiency.

- Check and repair leaky hot water faucets. A leak of only 1 drop a second can mean a loss of 700 gallons of hot water a year. It costs money to heat wasted water.

- Take brief showers or use a small amount of water in the tub. Fine spray shower heads use much less water than coarse sprays.

- Wash clothes only when there is a full load. Use cold or warm water whenever possible.

- Use dishwasher only when there's a full load. Dishwashers use a small amount of electricity but lots of hot water.

- If you wash dishes by hand, don't let the rinse water run continuously. Turn it on and off as needed.

- When going on vacation, turn your water heater to a lower setting (not "OFF").

- Hot water pipes that pass through an unheated portion of the house should be insulated with 2" think blanket insulation. This can be fastened with tape or wire.

KITCHEN

- Cook with the oven whenever possible. It is more efficient because oven heating elements are [illegible] on all the time, as they are in surface units.

- Not all oven cooked foods require a preheated oven. Rule of thumb: If food takes more than 1 hour to cook, start with an unheated oven. Casseroles and meats are examples of foods that can be started in a cold oven.

- Try to keep from peeking in the oven. Every time you open the door, you lose 25% of your heat.

- Reduce oven temperature by 25° when baking in glass or ceramic utensils. They absorb heat and baking is faster.

- Bring frozen meats to room temperature before roasting or broiling. This reduces cooking time.

- On surface cooking units, use utensils with flat bottoms and tight-fitting covers and use the right size for burner—a small pan on a large burner wastes heat.

- Turn off surface units of an electric range a short time before food is done. Food will continue cooking from heat stored in coils.

- Start with hot tap water when you need water for boiling, and a major part of the heating will already be done.

- On the top of the stove, use the lowest temperature needed. Foods won't cook any faster with the temperature turned all the way up. Turn down to lower temperature or to simmer once liquids reach boiling point.

- Try to open and close the refrigerator/freezer door less often by removing several articles at once.

- Always let food cool to room temperature before placing in refrigerator.

- Set refrigerator temperature at 37 - 40°F, freezer at 5 - 10°F.

- Check to see that gaskets around refrigerator and freezer doors are tight. If a dollar bill pulls out easily when your door is closed, you need a new gasket.

- If frost in your freezer is more than ¼" thick, efficiency is reduced.

- Let frozen foods thaw in the refrigerator.

- Clean the condenser on your refrigerator at least twice a year--dust on the coils and the condenser makes the refrigerator work harder.

- Don't use the "dry cycle" on your dishwasher and save one-third of the energy used for a complete cycle.

- Dishwashers should be used after 8 p.m. to avoid peak demand on generating plants.

- For the most efficient use of fuel, gas burners should have a steady blue flame. A yellow flame indicates cleaning or adjusting are necessary.

SPACE HEATING

- You can save 12% on your annual heating bill by lowering your thermostat from 70° to 68° during the day and from 68° to 65° at night.

- Don't be a thermostat fiddler. Switching room temperatures back and forth a lot wastes fuel.

- An open fireplace chimney damper may let 20% of the heat in a house escape. Open the damper only when using the fireplace.

- In extremely cold weather, fireplace fires draw more heat up the chimney than they give off into a room. Fireplaces are most efficient on those "in between" days.

- Increased humidity makes the air seemer warmer. If your house does not have a humidifier, consider placing pans of water near registers or radiators.

- Close outside doors promptly to keep heat inside.

- Close doors and turn off heat in rooms being ventilated or which are not in use.

- Remove rugs and furniture from places where they block radiators or registers.

- If you have gas heat, shut off the pilot when the heating season ends.

- Loose fitting windows and doors can be thought of as just a little bit open all the time. Check for air leaks on a windy day.

- If you like to sleep with an open window, close your bedroom door. This will retain heat in other rooms in the house.

- Use weather stripping to seal up air leaks around windows and doors. Those made of felt or rubber should be considered temporary since they wear quickly and tend to shrink. Metal weatherstripping is permanent.

- Close drapes and pull shades at night and on cloudy or windy days during winter. Open shades and drapes on sunny days. Keep in mind that very little sunlight comes in from the north and west windows in winter, but cold winds blow from this direction.

- With forced air heat, change or clean furnace filters frequently, at least once a month.

- Check to be sure all windows are closed tightly.

- Lower your thermostat to 55° when you're going to be away for a day or longer.

- Check around your window frames, door frames and chimneys for cracks. The easiest way to fill cracks is with caulking. First, clean away any grease, dirt or old caulking. Do this early in the season or on a warm day as temperature must be above 45°F.

SPACE COOLING

- Usually, you will be more comfortable, even at a higher temperature, if the humidity is around 40 to 50%. In a high humidity area, a dehumidifier is essential for comfort and economical operation of your air conditioner. Save moisture producing activities, such as showering and laundry, for cool early morning or late evenings.

- Turn off cooking units when not in use. Use an exhaust fan above your range.

- Keep your air conditioner and filters clean, and don't block the unit with drapes or furniture.

- Place window units on the north or shady side of the house to reduce their workload.

- Turn off unnecessary lights or appliances, such as TV sets, which produce heat.

- When purchasing a window air conditioning unit, make sure that the size is appropriate for the size of your room in order to assure maximum efficiency.

- A ventilating fan will exhaust the extreme heat in an attic. Turn on the fan only when the sun's rays are directly on the roof, or use one governed by a thermostat set at 110°F.

MAJOR

- Storm windows will cut in half the heat that is needlessly lost through the windows in your house.

- If you can't install storm windows, install plastic sheeting at least 6 ml. thick.

- Have heating equipment checked, cleaned and adjusted for top efficiency.

- Add insulation in ceilings and walls.

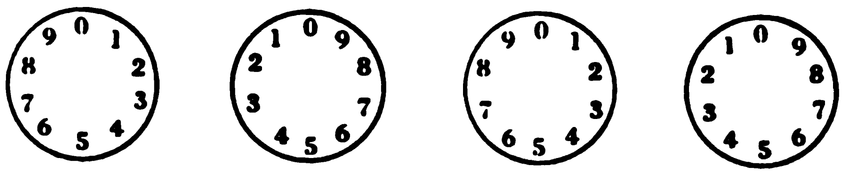
APPENDIX F4

ELECTRICITY/NATURAL GAS RECORDING FORMS

NATURAL GAS
(if applicable)

Record the reading from your gas meter directly onto this form. Each reading should be done at the same time of day.

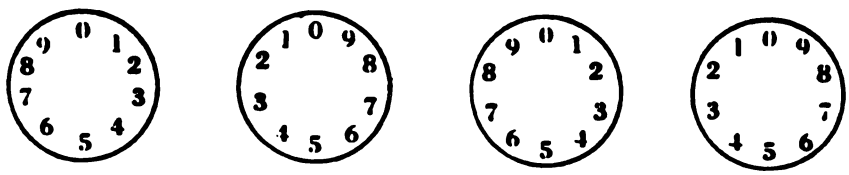
SATURDAY, APRIL 8 TIME: ______________



READING ________

- -

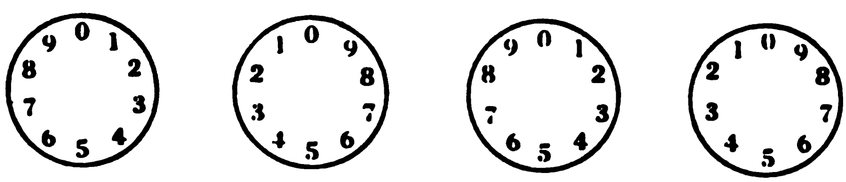
SATURDAY, APRIL 15 TIME: ______________



READING ________

- -

SATURDAY, APRIL 22 TIME: ______________



READING ________

APPENDIX F5

ELECTRICITY/NATURAL GAS/FUEL OIL OR PROPANE COMPUTATION FORMS

COMPUTATION FORM
ELECTRICITY

Saturday, April 8: meter reading #1________________

Saturday, April 15: meter reading #2________________

Saturday, April 22: meter reading #3________________

STEP 1: FIRST WEEK'S CONSUMPTION (no conservation in effect):

________________ - ________________ = ________________
Meter reading #2 - Meter reading #1 = 1st week's consumption

Example:

The 1st Saturday's meter reads 13388
The 2nd Saturday's meter reads 13488

How much was consumed? 13488
13388
100 kilowatt-hours

STEP 2: SECOND WEEK'S CONSUMPTION (conservation in effect):

________________ - ________________ = ________________
Meter reading #3 - Meter reading #2 = 2nd week's consumption

STEP 3: SAVINGS

To find out how much energy you saved during the 2nd week as compared to the 1st week, subtract as follows:

________________ - ________________ = ________________
1st week's consumption - 2nd week's consumption = savings

APPENDIX G

YOUTH ENERGY SURVEY

Energy Conservation Questionnaire

Dear Student:

The following questionnaire is designed to gather information on your attitudes toward energy conservation. The first four pages of the questionnaire will ask for descriptive information (i.e. information about your home, your age, sex, etc.). The last eight pages present a series of statements.

After each statement you will have an opportunity to indicate whether you strongly agree, agree, are undecided, disagree or strongly disagree with the statement. After each statement we would like you to circle the response which best represents your own attitude.

Two examples are shown below:

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
27. Energy conservation will help mankind.	SA	(A)	U	D	SD
28. I am willing to drive slower to save gasoline. . . .	SA	A	U	(D)	SD

It is important to note that, if you do not wish to answer any individual question in this questionnaire, simply skip that question and continue with the remainder of the questionnaire. If you have no questions, please turn the page and begin.

Thank you for your help

DESCRIPTIVE INFORMATION

Please place your birthdate and your first and last initials in the boxes provided below. For example, if your name was Joe Smith and you were born on April 6, 1960, you would fill out these boxes as shown below:

(April 6, 1960)

0	4	0	6	6	0

Month Day Year

(Joe Smith)

J	S

First Initial Last Initial

Notice that if your birth month or birthday is less than ten, you should put a zero (0) in front of the appropriate number. (i.e. May = 05, July = 07, etc.).

Your Date of Birth

Month Day Year

First Initial Last Initial

QUESTION	ANSWERS (Circle one for each question)
1. Please circle your grade in school......	06 07 08 09 10 11 12
2. Sex.....................................	Female Male
3. Your age................................	11 12 13 14 15 16 17 18 19
4. How many brothers and sisters do you have?..............................	0 1 2 3 4 over 4
5. How many adults live in your home?......	0 1 2 3 4 over 4
6. Are you a member of the 4-H organization?...........................	Yes No

QUESTIONS	ANSWERS (Circle one for each question)
7. Do you own your own car?.	Yes No
8. If yes, would you call your own car a .	Subcompact Compact Midsized Full-Sized
9.a. How many cars does your family own? . .	0 1 2 over2
9.b. Would you call your largest (or only) family car a.	Subcompact Compact Midsized Full-Sized
10. Do you live in an	Apartment Duplex Mobile Home Condominium House
11. Does your family rent, lease or own your home?	Rent Lease Own Don't Know
12. Have you ever attended an energy conservation meeting outside your school?.	Yes No
13. Have you ever attended an energy conservation presentation in one of your school classes?	Yes No
If yes, approximately how many class hours on energy conservation have you attended?.	0 1 2 3 4 4-10 11-20 over 20
14. Approximately how many total pages of information about energy have you read in the past week?	0 1-5 6-10 11-20 over 20

STUDENT ENERGY CONSERVATION ETHIC ITEMS (Please circle the answer that best reflects your own attitudes)	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
15. New ways to conserve energy for mankind should <u>not</u> be developed if my taxes have to be increased to pay for them.	SA	A	U	D	SD
16. I would ride my bike or walk rather than ride in a car if it helped save energy.	SA	A	U	D	SD
17. I am willing to change my life-style to conserve energy.	SA	A	U	D	SD
18. I am willing to attend football games right after school (instead of at night) to save lighting energy. .	SA	A	U	D	SD
19. Energy conservation is one of the most important objectives of my generation	SA	A	U	D	SD
20. I am willing to spend 4 hours caulking the windows in our house or apartment	SA	A	U	D	SD
21. I would like my family to keep the thermostat below 70^{o} in our house.	SA	A	U	D	SD
22. The best way for an individual like myself to deal with today's energy shortage is to ignore it and let the scientist worry about it.	SA	A	U	D	SD
23. Conserving energy will cause people to lose jobs. . . .	SA	A	U	D	SD
24. I would like my parents to buy solar collectors for the roof of our house or apartment.	SA	A	U	D	SD

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
25.	The Michigan state government should make energy conservation a high priority.	SA	A	U	D	SD
26.	I would like my parents to insulate or otherwise reduce our home heating	SA	A	U	D	SD
27.	We can decrease our need to build more power plants by encouraging energy conservation.	SA	A	U	D	SD
28.	The effort made by individuals to conserve energy can have a major impact on our energy problem	SA	A	U	D	SD
29.	The government should spend a larger portion of their present budget on energy conservation	SA	A	U	D	SD
30.	I would not really change the way I do things just to help save energy	SA	A	U	D	SD
31.	I would like my family to reduce their use of electrical energy	SA	A	U	D	SD
32.	If I can, I will buy a fast car with a big engine rather than a slower, small engine car.	SA	A	U	D	SD
33.	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
34.	I am willing to attend regular weekly meetings of a neighborhood energy conservation association. . . .	SA	A	U	D	SD
35.	I would like my parents to buy an energy efficient car the next time they buy a car.	SA	A	U	D	SD

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
36. I am willing to drive 55 mph or slower to save gasoline .	SA	A	U	D	SD
37. Solving our energy problems through energy conservation will cost less than building new power plants	SA	A	U	D	SD
38. I am willing to help my family build a solar water heater.	SA	A	U	D	SD
39. I am willing to spend 4 hours helping my family better insulate our house or apartment	SA	A	U	D	SD
40. If it meant any extra work for me, I would <u>not</u> favor new laws being passed to help save energy for mankind . .	SA	A	U	D	SD
41. Government should use taxes to increase energy conservation.	SA	A	U	D	SD
42. Individuals like myself should <u>not</u> be expected to help pay the cost of finding new ways to conserve energy . . .	SA	A	U	D	SD
43. Cars should be taxed by miles per gallon rather than weight	SA	A	U	D	SD
44. I would like to spend 4 hours doing volunteer work on energy conservation	SA	A	U	D	SD
45. I would like to help build a solar collector on the roof of our house or apartment.	SA	A	U	D	SD
46. I am willing to ride a bus to in-town recreational events.	SA	A	U	D	SD

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
47.	My individual efforts can help solve the energy problem.	SA	A	U	D	SD
48.	I would like to help build a windmill to help provide energy for our house	SA	A	U	D	SD
49.	Property taxes should be higher for the homes of people that use larger quantities of energy.	SA	A	U	D	SD
50.	Government should provide tax free loans to help people insulate their homes.	SA	A	U	D	SD
51.	I would appreciate it if my parents would carpool with neighbors	SA	A	U	D	SD
52.	I am willing to take cooler showers or baths to save energy	SA	A	U	D	SD
53.	Saving our limited supply of energy should be thought of as one of our nations most important problems . . .	SA	A	U	D	SD
54.	I am willing to spend 4 hours helping other people make their homes energy efficient.	SA	A	U	D	SD
55.	The federal government should make energy conservation a high priority.	SA	A	U	D	SD
56.	I would like my family members to drive less and walk or ride a bike more.	SA	A	U	D	SD

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
57. I would favor using as much energy as needed for me to be comfortable and not worry about man's future needs.	SA	A	U	D	SD
58. I don't worry about conserving energy because new technology will solve the energy problem	SA	A	U	D	SD
59. I favor the increased use of nuclear power	SA	A	U	D	SD
60. Energy conservation will produce more jobs	SA	A	U	D	SD

ENERGY CONSERVATION TASKS

Please review the list of tasks shown below and indicate whether you or your parents have completed any of those tasks listed <u>in the past six months</u>.

In the past six months have your parents.....	Answers: (Circle One)	
61. Added three inches or more of insulation in your attic?.........................	Yes	No
62. Caulked your home's doors or windows....	Yes	No
63. Lowered the thermostat by three degrees or more...............................	Yes	No
64. Installed a new furnace................	Yes	No
65. Traded in a large car for a smaller one.	Yes	No
66. Installed a solar collector............	Yes	No
67. Carpooled ten times or more............	Yes	No

In the past six months have you.............	Answers: (Circle One)	
68. Asked your parents to do any of the tasks listed above..........................	Yes	No
69. Helped your parents add insulation to your home.................................	Yes	No
70. Helped your parents caulk your windows or doors................................	Yes	No
71. Helped your friends parents insulate or caulk their homes......................	Yes	No
72. Helped any other people insulate or caulk their homes...........................	Yes	No
73. Ridden to school on a bus <u>over</u> <u>ten</u> <u>times</u>.................................	Yes	No
74. Ridden home from school in a bus <u>over</u> <u>ten</u> <u>times</u>..............................	Yes	No
75. Ridden to school in a car with two or more other people......................	Yes	No
76. Ridden home from school in a car with two or more other people...................	Yes	No
77. Ridden to a social or recreational event in a bus <u>over</u> <u>five</u> <u>times</u>...............	Yes	No
78. Ridden to a social or recreational event in a car with two or more other people..	Yes	No
79. Bought a car with six (6) cylinders or less..................................	Yes	No
80A. Conserved energy in any other way.......	Yes	No
80B. If yes, please describe below what else you did to conserve energy. ____________________ ____________________ ____________________		

<u>THANK</u> <u>YOU</u> for completing this questionnaire.

APPENDIX H

HOME ENERGY SURVEY

Your Name________________________

HOME ENERGY SURVEY

How do you cook?

_____ electric stove

_____ natural gas stove

_____ other. Please describe____

How is your hot water heated?

_____ electric

_____ natural gas

_____ other. Please describe____

How is your home heated?

_____ electric _____ fuel oil _____ wood

_____ natural gas _____ propane

_____ other. Please describe____

. . . .

Power company that supplies your electricity:

Name____

Address____

Your Account Number, if known________________________

Utility company that supplies your natural gas (if applicable):

Name____

Address____

Your Account Number, if known________________________

Dealer that has been supplying your fuel oil since January, 1977 (if applicable): (If you have changed dealers since January, 1977, list them all and include approximate dates of service.)

Name______________________________Address______________________________

Name______________________________Address______________________________

Name______________________________Address______________________________

Dealer that has been supplying your propane or other gas since January, 1977 (if applicable): **(If you have changed dealers since January, 1977, list them all and include approximate dates of service.)**

Name______________________________**Address**______________________________

Name______________________________**Address**______________________________

Name______________________________**Address**______________________________

APPENDIX I

HOME ENERGY CONSERVATION SURVEY

HOME ENERGY CONSERVATION SURVEY

This is a survey of what kinds of actions you or members of your family have taken during the past month to conserve energy in your home. We are interested in separate ratings for you and for other family members. (In the case of sisters and/or brothers, give a combined rating if more than one individual is involved.)

Use the following scale:

0 = not at all
1 = once
2 = twice
3 = three times or more

Example: If you had carpooled twice during the past month, your father five times, your mother not at all, your sister once and your brother once, you would answer the following question:

	Yourself	Father	Mother	Sisters &/ or Brothers
Ridden to a social or recreational event in a car with two or more other people.	2	3	0	2

Name______________________________

Address____________________________

____

	Yourself	Father	Mother	Sisters &/ or Brothers
LIGHTING				
1. Turned off a light in a room which was discovered unoccupied.	___	___	___	___
2. Turned off incandescent lights when leaving a room for 3 minutes or more	___	___	___	___
3. Turned off fluorescent lamps when leaving a room for 15 minutes.	___	___	___	___
4. Switched to bulbs of lower wattage in halls, stairways and other areas of general illumination.	___	___	___	___
5. Checked to see if lighting fixtures were clean. . . .	___	___	___	___
6. Switched to fluorescent lighting or to one large bulb in an area where a lot of light needed.	___	___	___	___
7. Switched from incandescent lighting to fluorescent in any other area.	___	___	___	___
APPLIANCES				
8. Turned off a TV set, radio or stereo when no one was interested.	___	___	___	___
9. Unplugged a TV set with the "instant on" feature when it was not in use	___	___	___	___
10. Used clothes dryer only when there was a full load. .	___	___	___	___
11. Did not overload dryer.	___	___	___	___
12. Cleaned lint filter of the dryer after each use . . .	___	___	___	___
13. Dried consecutive loads to avoid reheating the element once the dryer was warmed up.	___	___	___	___
14. Line dried garments and household items	___	___	___	___
15. Did a large batch of ironing to reduce the number of times the iron must be heated up.	___	___	___	___
HOT WATER				
16. Checked to see if the water heater temperature was set between 120^{o}F and 140^{o}F	___	___	___	___
17. Drained a pail of water from the bottom of the hot water tank.	___	___	___	___

	Yourself	Father	Mother	Sisters &/ or Brothers
18. Repaired leaky hot water faucets.	___	___	___	___
19. Took shorter showers or used a smaller amount of water in the tub.	___	___	___	___
20. Washed clothes only when there was a full load. . . .	___	___	___	___
21. Used cold or warm water for washing clothes	___	___	___	___
22. Used dishwasher only when there was full load	___	___	___	___
23. When washing dishes by hand, turned the rinse water on and off as needed, rather than let it run continuously	___	___	___	___
24. Insulated hot water pipes that pass through an unheated portion of the house.	___	___	___	___
<u>KITCHEN</u>				
25. Planned an entire meal to be cooked in the oven rather than with surface units	___	___	___	___
26. Followed this rule of thumb: If food takes more than 1 hour to cook, start with an unheated oven	___	___	___	___
27. Reduced the oven temperature by 25° when baking in glass or ceramic utensils	___	___	___	___
28. Brought frozen meats to room temperature before roasting or broiling to reduce cooking time.	___	___	___	___
29. On surface cooking units, used utensils with flat bottoms and tight-fitting covers and used the right size for burner.	___	___	___	___
30. Turned off surface cooking units of an electric range a short time before food was done and allowed food to continue cooking from heat stored in coils.	___	___	___	___
31. Started with hot tap water when water was needed for boiling	___	___	___	___
32. Once liquids reached boiling point, lowered temperature to simmer	___	___	___	___
33. Removed several articles at once from refrigerator to avoid opening and closing door frequently	___	___	___	___

	Yourself	Father	Mother	Sisters &/ or Brothers
34. Let food cool to room temperature before placing in refrigerator.	___	___	___	___
35. Checked to see if refrigerator temperature set at 37 - 40°F, freezer at 5 - 10°F.	___	___	___	___
36. Checked to see that gaskets around refrigerator and freezer door tight.	___	___	___	___
37. Defrosted freezer if frost was more than ¼" thick . .	___	___	___	___
38. Let frozen food thaw in refrigerator.	___	___	___	___
39. Cleaned dust from condenser and coils of your refrigerator.	___	___	___	___
40. Used a dishwasher but did not use the "dry cycle" . .	___	___	___	___
41. Used dishwasher after 8 p. m. to avoid peak demand on generating plants	___	___	___	___
42. Had the gas burners of your stove adjusted if the flame was yellow instead of a steady blue	___	___	___	___
SPACE HEATING				
43. Kept thermostat at 68°F or lower during the day and 65°F or lower at night.	___	___	___	___
44. Checked to make sure the fireplace chimney damper was closed when not in use.	___	___	___	___
45. Placed pans of water near registers or radiators to increase humidity	___	___	___	___
46. Closed outside doors promptly to keep heat inside . .	___	___	___	___
47. Closed doors and turned off heat in rooms being ventilated or which were not in use.	___	___	___	___
48. Removed rugs and furniture from places where they were blocking radiators or registers.	___	___	___	___
49. Checked for air leaks on a windy day around windows and doors	___	___	___	___
50. Installed weather stripping to seal up air leaks around windows and doors.	___	___	___	___

		Yourself	Father	Mother	Sisters &/ or Brothers
51.	When sleeping with an open window, closed bedroom door to retain heat in other rooms in the house . . .	___	___	___	___
52.	Closed drapes and pulled shades at night and on cloudy or windy days.	___	___	___	___
53.	Opened shades and drapes on sunny days.	___	___	___	___
54.	Changed or cleaned furnace filters.	___	___	___	___
55.	Checked to be sure all windows were closed tightly. .	___	___	___	___
56.	Lowered your thermostat to 55°F when family going away for a day or longer.	___	___	___	___
57.	Checked around the outside of window frames, door frames and chimneys for cracks.	___	___	___	___
58.	Filled cracks with caulking	___	___	___	___
MAJOR					
59.	Installed storm windows or plastic sheeting at least 6 ml. thick	___	___	___	___
60.	Had heating equipment checked, cleaned and adjusted for top efficiency.	___	___	___	___
61.	Added insulation in ceilings or walls	___	___	___	___

THANK YOU for completing this form.

APPENDIX J

ESSAY QUESTIONNAIRE

QUESTIONNAIRE

1. What methods did you use to get other members of your family to conserve energy during your intensive energy conservation week?

2. Which one of these methods (if you used more than one) do you feel worked best? Did one method work best with one family member, while a different method worked best with another member? Explain.

Name____________________________________

Address__________________________________

____

APPENDIX K

DEMOGRAPHICS QUESTIONNAIRE

QUESTIONNAIRE

The following questionnaire is optional. However, if you do wish to fill it out, the information will be very helpful to our study.

1. How many adults (age 18 or older) live in your household?____________. How many children (under 18 years of age)?______________.

2. Education completed (husband):

_____ 11 years or less
_____ high school diploma
_____ one or more years of college
_____ Bachelors degree
_____ Masters degree
_____ Ph.D.

Education completed (wife):

_____ 11 years or less
_____ high school diploma
_____ one or more years of college
_____ Bachelors degree
_____ Masters degree
_____ Ph.D.

3. Husband's occupation:

____

Wife's occupation:

____

4. Income (husband's):

_____ $0 - $5,000
_____ $5,001 - $10,000
_____ $10,001 - $15,000
_____ $15,001 - $20,000
_____ $20,001 - $25,000
_____ $25,001 - $30,000
_____ over $30,000

Income (wife's):

_____ $0 - $5,000
_____ $5,001 - $10,000
_____ $10,001 - $15,000
_____ $15,001 - $20,000
_____ $20,001 - $25,000
_____ $25,001 - 30,000
_____ over $30,000

*This information will be held strictly confidential.

APPENDIX L

TABLES

Table A.--Chi-Square Analyses of Manipulation Check Data from Youth Energy Survey Questionnaire.

	TO Group		INFO Group		CON Group		χ^2	df	Prob.
	Yes	No	Yes	No	Yes	No			
In the past six months have your parents . . .									
Added three inches or more of insulation in your attic?	7	20	4	20	10	21	1.73	2	.42
Caulked your home's doors or windows?	12	15	9	15	15	16	0.66	2	.72
Lowered the thermostat by three degrees or more?	26	1	19	5	22	9	6.34	2	.04
Installed a new furnace?	4	23	4	20	2	29	1.58	2	.45
Traded in a large car for a smaller one?	5	22	4	20	5	26	0.06	2	.97
Installed a solar collector?	1	26	0	24	0	31	2.06	2	.37
Carpooled ten times or more?	20	7	14	10	17	14	2.49	2	.29

Table A.--Continued.

	TO Group		INFO Group		CON Group		χ^2	df	Prob.
	Yes	No	Yes	No	Yes	No			
In the past six months have you									
Asked your parents to do any of the tasks listed above?	19	8	15	9	9	22	11.26	2	.004
Helped your parents add insulation to your home?	5	21	3	21	8	23	1.52	2	.47
Helped your parents caulk your windows or doors?	10	17	5	19	9	22	1.61	2	.45
Helped your friends parents insulate or caulk their homes?	5	22	1	23	2	29	3.59	2	.17
Helped any other people insulate or caulk their homes?	5	22	2	22	4	27	1.15	2	.56
Ridden to school on a bus over ten times?	14	13	12	12	16	15	0.02	2	.99
Ridden home from school on a bus over ten times?	14	13	12	12	16	15	0.02	2	.99

Table A.--Continued.

	TO Group		INFO Group		CON Group		χ^2	df	Prob.
	Yes	No	Yes	No	Yes	No			
In the past six months have you									
Ridden to school in a car with two or more other people?	19	8	14	10	17	14	1.56	2	.46
Ridden home from school in a car with two or more other people?	23	4	13	11	19	12	6.29	2	.04
Ridden to a social or recreational event in a bus over five times?	17	10	11	13	13	18	2.79	2	.25
Ridden to a social or recreational event in a car with two or more other people?	26	1	22	2	29	2	0.49	2	.78
Bought a car with six (6) cylinders or less?	3	24	6	18	4	27	2.16	2	.34
Conserved energy in any other way?	22	5	21	3	18	13	7.21	2	.03

Table B.--Analysis of Variance and Group Means for Subscale (General Willingness to Sacrifice to Conserve Energy).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	3.7690	2	1.8845	7.2150*	
Within Groups	20.8952	80	.2612		
Total	24.6642	82			
TO Group					4.1204^{a}
INFO Group					3.7300^{b}
CON Group					3.6290^{b}

*$p < .0013$.

Note: Means not sharing a common superscript differ at the $p < .05$ level following the application of the Scheffé test. Higher group means indicate greater agreement.

Table C.--Analysis of Variance and Group Means for Subscale (Willingness to Take Specific Energy Conservation Actions).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	4.9339	2	2.4670	9.0484*	
Within Groups	21.8111	80	.2726		
Total	26.7450	82			
TO Group					3.8148^{a}
INFO Group					3.5200^{ab}
CON Group					3.2304^{b}

*$p < .0003$.

Note: Means not sharing a common superscript differ at the $p < .05$ level following the application of the Scheffé test. Higher group means indicate greater agreement.

Table D.--Analysis of Variance and Group Means for Subscale (Home Heating Related Energy Conservation).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	4.2805	2	2.1403	7.9276*	
Within Groups	21.5981	80	.2700		
Total	25.8786	82			
TO Group					4.0074^{a}
INFO Group					3.8640^{a}
CON Group					3.4839^{b}

*$p < .0007$.

Note: Means not sharing a common superscript differ at the $p < .05$ level following the application of the Scheffé test. Higher group means indicate greater agreement.

Table E.--Analysis of Variance and Group Means for Subscale (Government Involvement in General in Energy Conservation).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	1.6809	2	.8405	5.4011*	
Within Groups	12.4486	80	.1556		
Total	14.1295	82			
TO Group					4.3056[a]
INFO Group					4.0300[b]
CON Group					3.9839[b]

*$p < .0063$.

Note: Means not sharing a common superscript differ at the $p < .05$ level following the application of the Scheffé test. Higher group means indicate greater agreement.

Table F.--Analysis of Variance and Group Means for Subscale (Energy Conservation Is Important).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	1.5283	2	.7642	3.0786*	
Within Groups	19.6089	79	.2482		
Total	21.1372	81			
TO Group					4.2963
INFO Group					4.0729
CON Group					3.9758

*p < .0516.

Note: Higher group means indicate greater agreement.

Table G.--Analysis of Variance and Group Means for Subscale (Taxes and Energy Conservation).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	1.3123	2	.6561	1.9384*	
Within Groups	27.0793	80	.3385		
Total	28.3916	82			
TO Group					3.7037
INFO Group					3.5200
CON Group					3.4032

*$p < .1506$.

Note: Higher group means indicate greater agreement.

Table H.--Analysis of Variance and Group Means for Subscale (Energy Conservation Is Feasible).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	1.4102	2	.7051	2.8525*	
Within Groups	19.7751	80	.2472		
Total	21.1852	82			
TO Group					4.2222
INFO Group					3.9900
CON Group					3.9194

*$p < .0636$.

Note: Higher group means indicate greater agreement.

Table I.--Analysis of Variance and Group Means for Subscale (Automobile Related Energy Conservation).

Source of Variation	Sum of Squares	df	Mean Squares	F	Means
Between Groups	.8385	2	.4193	2.0440*	
Within Groups	16.4096	80	.2051		
Total	17.2481	82			
TO Group					4.0463
INFO Group					3.9400
CON Group					3.8065

*p < .1362.

Note: Higher group means indicate greater agreement.

Table J.--Omnibus F Ratios and Probability Values for Analysis of Variance of Monthly Electricity Difference Scores.

	F Ratio	F Probability
January	.6478	.5274
February	1.0640	.3526
March	.7251	.4892
April	.3860	.6817
May	.9859	.3800
June	.0549	.9466
July	.5876	.5594
August	.9965	.3761
September	1.3634	.2648
October	.4172	.6611
November	.2505	.7794
December	.4678	.6290

*Note: Difference scores = 1977 electricity consumption (KWH) - 1978 electricity consumption (KWH).

Table K.--Mean Monthly Difference Scores (1977 minus 1978) for Electricity Consumption (in KWH).

	TO Group	INFO Group	CON Group
January	75	52	9
February	13	57	-23
March	-15	63	-3
April	17	-1	-18
May	2	22	-31
June	3	13	0
July	14	18	-20
August	23	45	-13
September	49	84	4
October	17	72	47
November	61	8	32
December	16	97	23

Note: Higher means indicate greater savings for experimental periods.

Table L.--Mean Monthly Fuel Oil, Natural Gas, and Propane Consumption (in BTUs).

	TO Group		INFO Group		CON Group	
	1977	1978	1977	1978	1977	1978
January	18768	18260	23209	20494	18461	18137
February	19962	17829	21052	18872	19994	17854
March	20992	18675	20403	19395	21437	17497
April	24475	21348	23776	19204	25646	19870
May	30427	24660	30787	24434	30483	25245
June	31359	27009	36000	30505	29752	27349
July	47074	42465	40812	38121	41989	35830
August	30571	41704	27357	37057	24763	36787
September	24828	24778	24642	23961	23486	23935
October	21331	21703	20441	19202	21478	21712
November	18195	18422	19418	20916	18218	16296
December	17985	17924	21170	21386	17989	18948

Table M.--Omnibus F Ratios and Probability Values for Analysis of Variance of Monthly Fuel Oil, Natural Gas, and Propane Consumption Data.

	1977		1978	
	F Ratio	F Probability	F Ratio	F Probability
January	1.557	.223	.356	.702
February	.089	.915	.079	.924
March	.054	.948	.278	.759
April	.111	.895	.180	.836
May	.002	.998	.019	.981
June	.343	.711	.161	.852
July	.124	.884	.208	.813
August	.503	.608	.130	.879
September	.054	.947	.019	.981
October	.049	.952	.209	.812
November	.092	.913	1.095	.344
December	.745	.481	.394	.677

Table N.--Mean Monthly Difference Scores (1977 minus 1978) for Fuel Oil, Natural Gas, and Propane Consumption (in BTUs).

	TO Group	INFO Group	CON Group
January	508	2714	324
February	2134	2180	2140
March	2318	1008	3940
April	3127	4572	5776
May	5767	6353	5238
June	4351	5496	2403
July	4609	2692	6158
August	-11133	-9700	-12025
September	50	681	-450
October	-373	1239	-234
November	-227	-1497	1922
December	60	-215	-959

Note: Higher means indicate greater savings for experimental period.

Table O.--Omnibus F Ratios and Probability Values for Analysis of Variance of Monthly Difference Scores for Fuel Oil, Natural Gas, and Propane Consumption.

	F Ratio	F Probability
January	1.688	.197
February	.001	.999
March	1.923	.159
April	.746	.480
May	.042	.959
June	.192	.826
July	.167	.846
August	.046	.955
September	.049	.952
October	.180	.836
November	1.085	.347
December	.087	.917

Table P.--Group Means for Home Energy Conservation Survey.

	Youth	Father	Mother	Siblings	Family
	Variety of Conservation Tasks Performed				
TO Group	22.50	18.45	33.05	14.95	90.37
INFO Group	21.52	20.85	29.71	13.43	86.45
CON Group	18.68	21.76	30.88	12.76	84.08
	Total Times All Conservation Tasks Performed				
TO Group	49.50	40.75	85.35	30.50	208.15
INFO Group	53.61	51.90	79.10	32.95	219.75
CON Group	46.60	54.44	83.32	30.64	215.00

Note: Higher means indicate a greater variety and larger number of tasks performed.

Table Q.--Omnibus F Ratios and Probability Values for One-Way Analyses of Variance of Home Energy Conservation Survey.

	F Ratio	F Probability
Variety of Conservation Tasks Performed		
Youth	1.0164	.3677
Father	.3350	.7166
Mother	.5516	.5788
Siblings	.1891	.8282
Family	.1790	.8370
Total Times All Conservation Tasks Performed		
Youth	.4880	.6162
Father	.9416	.3954
Mother	.2734	.7617
Siblings	.0494	.9518
Family	.0910	.9130

Table R.--Marginal Means for Home Energy Conservation Survey.

	TO Group	INFO Group	CON Group	Means
	Variety of Conservation Tasks Performed			
Youth				20.94
Father				20.38
Mother				31.08
Siblings				13.63
Means	22.01	21.41	21.02	
	Total Times All Conservation Tasks Performed			
Youth				50.11
Father				49.25
Mother				82.30
Siblings				31.33
Means	50.73	54.44	53.75	

Note: Higher means indicate a greater variety and larger number of tasks performed.

Table S.--Two-Way Analyses of Variance of Home Energy Conservation Survey (Variety of Conservation Tasks Performed and Total Times All Conservation Tasks Performed).

Source of Variation	Sum of Squares	df	Mean Squares	F
	Variety of Conservation Tasks Performed			
Main Effects	10107.87	5	2021.57	15.19
Treatment Group	54.76	2	27.38	.21
Family Member	10064.24	3	3354.75	25.20*
2-Way Interactions				
Group Family	413.72	6	68.95	.52
Residual	33012.55	248	133.12	
Total	43534.14	259	168.09	
	Total Times All Conservation Tasks Performed			
Main Effects	87937.43	5	17587.49	20.74
Treatment Group	563.42	2	281.71	.332
Family Member	87307.25	3	29102.42	34.32*
2-Way Interactions				
Group Family	2751.83	6	458.64	.54
Residual	210285.09	248	847.92	
Total	300974.35	259	1162.06	

*p < .001.

Table T.--Means, t Values, and Probability Values for Workshop Evaluation Questionnaire Items.

	Mean		T Value	2-Tail Probability
	TO	INFO		
Overall experience	3.83	3.52	1.38	.173
General value	4.04	3.80	.91	.370
Objectives stated	4.88	4.64	1.41	.167
Objectives met	3.96	3.44	1.99	.053
Lectures	3.38	3.36	.09	.927
Audio visual	3.13	3.00	.69	.491
Discussion and questions	2.79	2.92	-1.28	.207
Group activities	2.88	3.04	-1.00	.321
Quantity printed material	3.08	3.32	-1.37	.178
Content printed material	3.58	3.68	-.35	.726
Instructor presentation	4.38	4.16	1.00	.322
Instructor sensitivity	3.96	3.44	1.38	.174
Instructor organization	4.29	4.24	.26	.799
Group participation	4.71	4.72	-.07	.941
Instructor patience	4.83	4.64	1.29	.203

Table U.--Frequency of Methods Used by Students to Influence Their Family to Conserve Energy.

Method Used	Frequency
Gave them information about the energy problem.	5
Told them about specific energy saving things to do.	12
Reminded or "bugged them" as they were using energy.	6
Stressed dollar savings.	5
Told them it was a school/research project.	3
Asked them to do it as a favor or bribed them.	5
Gave general reminders to save energy.	3
Have not tried to get them to save energy.	1

Table V.--Two-Way Analysis of Variance of Demographic Information.

	Family Income	Father's Education	Mother's Education
1978 Electricity Usage			
January	*		
February	*		
March	*		
June	*		
July	*		
December	*		#
1978 Heating Usage			
January	*	*	
February	*	*	
March	*	*	
April	*	*	
May	*		
June	*#		
July	*#		
August	*		
September	*		
October	*		
December	*		
Electricity Difference Scores			
March	#		
April			#
May	*		
September			#
October	*		
November	*	*	
December	#		
Heating Difference Scores			
April		#	
May	*	*	
June		*	
July		*	
August			*
October			*
November		*	

*Main effect ($p < .05$).

#Interaction ($p < .05$).

FOOTNOTES

FOOTNOTES

[1]The meter reading instructions and the energy saving suggestions were also provided to the INFO group as part of the packet of materials given to them at the workshop. However, students in the INFO group were not specifically asked to use them.

[2]None of the mothers who supplied information regarding their level of education had completed a graduate degree. Therefore, there were only two categories of mother's education.

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REFERENCE NOTES

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