DOCUMENT RESUME

ED 190 345 SE 030 976

TITLE Youth Energy Extension Service Project. Final Report. Technical Report 79-10.

INSTITUTION Michigan State Univ., East Lansing. Science and Mathematics Teaching Center.

SPONS AGENCY Department of Energy, Washington, D.C.; Michigan Dept. of Commerce, Lansing.; Michigan State Energy Extension Service, Lansing.

PUB DATE 25 Oct 79

NOTE 157p.; For related documents, see SE 030 975-985 and ED 180 774. Not available in hard copy due to marginal legibility of original document.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Decision Making; *Energy; *Energy Conservation; *Extension Education; *Information Dissemination; *Nonformal Education; Public Policy; Science Education; Technology; Youth Clubs; *Youth Programs

IDENTIFIERS *Energy Education

ABSTRACT

Presented is a report on the efforts to implement an energy education program. The target population of the program is the general public. A specific goal was set to reduce energy consumption by at least 5% in at least 50% of the families with members in the high schools of the target areas. The extension-style energy education program was supported by the Cooperative Extension Service and involved the 4-H Youth Program. (RE)

TECHNICAL REPORT 79-10

YOUTH ENERGY EXTENSION SERVICE PROJECT - FINAL REPORT

by

4-H Youth Program
Science and Mathematics Teaching Center

YOUTH ENERGY EXTENSION SERVICE
PROJECT - FINAL REPORT

by

4-H Youth Program
Science and Mathematics Teaching Center

October 25, 1979

TABLE OF CONTENTS

I. INTRODUCTION

During August of 1977, the Michigan Department of Commerce (through the Michigan Energy Administration) was one of ten selected states to receive a grant from the Energy Research and Development Administration (now the U.S. Department of Energy). The grant proposed that the Michigan Energy Extension Service pilot a program designed to educate Michigan residents in methods of energy conservation and utilization of renewable energy sources.

Michigan State University contracted to carry out the Youth Energy portion of the Project; the 4-H Youth Program of the Cooperative Extension Service (CES) and the Science and Mathematics Teaching Center (SMTC) were the two units conducting the program. The Cooperative Extension Service provided field staff members to work directly with schools and youth; the Science and Mathematics Teaching Center was given the role of conducting teacher workshops on energy conservation.

The original objectives for the project were:

--To create an energy conservation ethic in at least 50,000 high school students.

--To reduce the energy consumption by at least 5% in at least 50% of the families with members in high schools in the target areas.

The target audience were adolescent youth in grades 9-12, who resided in five different geographical regions in the state of Michigan; each region contained from three to eight counties.

II. NARRATIVE OF 4-H AND SMTC PROGRAMS

1. 4-H Youth Programming

The programs were designed in phases with a variety of strategies and approaches. Each phase is described in sequence. Since home heating-cooling and automobile use account for over 80% of

family energy use, program emphasis was given to those two areas.

PHASE I January 1, 1978 - August 31, 1978

Four field staff were hired so that a staff member had responsibility for a 3-6 county area in Regions II - V. No staff was placed in Region I. Regional Coordinators had the responsibility of initiating energy conservation programming within the selected high schools. High schools were randomly assigned to program and control groups. Primary strategies used during this phase were:

Region I - No program until 2 1/2 day Summer Workshops at Higgins Lake and Walden Woods.

Region II - Teacher Workshop Model, a series of 3 workshops conducted by the Science and Mathematics Teaching Center in each of the three counties (see model I, SMTC). The school contact, recruitment of teachers, and the follow-up and evaluation collection was done by the Regional Coordinator. Mall shows and public information programming were used by the coordinator.

Region III - Assembly Programs were the major emphasis using "Energy Today and Tomorrow": a 45 minute program presented by Oak Ridge Associated Universities and a drama assembly program prepared and presented by the MSU Theatre Department. The drama program was a lighthearted presentation on the energy problem with the emphasis being given to the school to conduct a "No Drive - Drive" to cut down the number of cars in the high school parking lot. Eight schools scheduled the Energy, Today and Tomorrow assemblies and 7 schools scheduled the drama program. Only two schools conducted a full fledged No Drive-Drive with the winner reducing cars by

approximately 15.7% in a one week period. Although assembly programs reached 12,363 high school students in a 4 month period in this region, the evaluation indicated that they were not effective in bringing about attitude and behavior change in the desired direction.

Region IV - Assembly Programs using "Energy Today and Tomorrow" was the primary programming. Some use was made of the Energy-Environment Simulator which appeared to be a very effective teaching tool on energy supply - consumption concepts. This region had a six week later start up date, and less "Energy Today and Tomorrow" presentations were made in this region. There was a good involvement of the coordinator in mall shows and other public programs.

Region V - A teen Energy Awareness Team approach was used with teens being trained to conduct energy awareness programs for other teens. A large group of teens attended the March 1978 Teen Energy Workshop at Kettunen Center. This was followed up by two teen workshops in Region V. This region also had the benefit of Nancy Leedom who worked on her master's research during the Spring Term of 1978 in Marquette. She did the study of the "energy task" materials utilizing participants from the teen workshops.

Other Programming in all regions but primarily Regions II - V

Transportation Audits

A computer transportation program was developed and used to provide personalized feedback on potential dollar savings of car-pooling and other reductions in driving. This program was developed, pretested and ready for use with high school students within a three month period. A light switch sticker, "Turn Off Lights and Conserve Energy" was enclosed along with the transportation survey form. An

energy tip sheet "It Makes Good Cents to Save" was sent to the families along with the computer printout.

Teen Energy Workshop

An Energy Awareness Team Workshop was held March 3-5 at Kettunen Center for some 80 participants from all 5 regions with the purpose of helping them to understand the energy problem and develop presentations that they might give to peers and others on how we might conserve our energy resources. The evaluation from participants was very high, especially on topics such as home retrofitting.

Slide Tape "Energy Challenges Youth"

This slide tape was developed and used in June 1978 with an audience of over 4,000 and has been used in numerous programs since then including many schools. It depicts the energy problem and challenges youth to take action to conserve energy.

Displays

An Energy Bicycle, photovoltaic unit, and model solar hot water heater and other small displays were developed for use at Energy Fairs and other public events. These displays have been in almost constant use by counties through the state since they were developed. Energy quiz boards were developed and utilized in summer programs.

Printed Materials

"It Makes Good Cents to Save", an energy tip sheet was developed, printed and distributed. A "Science Fair Idea Sheet" was also developed and distributed.

4-H Exploration Day

This statewide event held June 22 - 28, 1978 featured energy related options, alternative energy resources, and display of energy

exhibits for over 5,000 youth and adults. The EES evaluation indicated that one of the three counties studied in a pre-post situation significantly gained in energy conservation scores. It should be pointed out that the 4-H participants on a pretest basis were 3.44 vs a 3.28 statewide average of high school students, thus the 4-H members were considerably more energy conscious before they attended the event.

Summer Programs

A wide variety of summer energy programs were provided to camps, day camps, and summer recreation programs. Region II utilized CETA and Community Action funded teen awareness teams supervised by adult CETA and Community Action staff. In Region III an awareness team from the Volunteer Center was utflized under the supervision of the coordinator. In Regions IV and V, the part time staff provided programs directly to camps and other programs with teen involvement. Energy quiz boards were developed and used at camps and fairs. Two summer workshops were held for high school teachers at Higgins Lake and Walden Woods (see SMTC models, Section 2.A). Promotion and recruitment for the workshops was andled by 4-H. We participated in an energy fair that was held at Grayling in Region IV, and conducted other community energy awareness programs in Regions II and III.

PHASE II September 1, 1978 - March 31, 1979

Phase II took a major change in direction based upon the evaluation of the Phase I program, particularly the school programs conducted January - June. It was found that efforts in working directly with teachers to increase energy conservation instruction appeared to have the best potential for meeting project goals and the plans were revised in this direction. The two part-time

coordinators in Regions IV and V were put on a full time basis as of October 1, 1978. The following models were utilized during this phase:

Teacher Training Model

This involved two workshops conducted by the Science and Mathematics Teaching Center in each of the five regions (see second SMTC Workshop Model, 2A). Schools were assigned at random to the workshop model. At random one of the workshops in each region was selected to devote a portion of the workshop to "task oriented" materials which featured electrical and gas meter readings and transportation logs. This was an evaluation design to test the effectiveness of the task or (behavior management) materials contained in the "Family Energy Project."

Two additional workshops were conducted in early 1979 by the Science and Mathematics Teaching Center in Region I because of the good response to the fall workshops. Promotion, recruitment, and arrangements for the workshops was handled by the 4-H Youth Program. Follow-up with the teachers trained was handled by 4-H staff.

Teacher Consultation Model

This model was used in Regions II - V. High schools were randomly assigned to this treatment. Teachers were provided individual and/or group consultation by the Regional Coordinator and provided with energy conservation educational materials. In some cases the coordinators conducted a brief in-service program in the high school. Often the coordinator met briefly with the teacher or teachers and explained the energy resource materials and their possible use.

Special Schools

In Regions II - V there was an opportunity to have at least one school that was not randomly assigned to a treatment. The most outstanding example of a Special School is Whitehall High School in Region III which conducted a year long energy class which featured high school students attempting to make their classroom energy self sufficient. A detailed analysis of the school physical properties was made with energy saving recommendations given to the school board. Conservation programs were also presented to the middle school students.

Committee School Model

This model was randomly assigned in Regions II and III only. The idea was to organize a total high school energy committee including students, teachers, administration and support staff. Physical plant and classroom energy conservation were both encouraged. Since it was difficult to organize a committee approach in a short period of time, much of the actual programming more closely resembled the Teacher Consultation Model.

Services to All Models in Regions II - V

In all regions during Phase II the transportation surveys with personalized computer printouts were used. In Regions II-V the Home Energy Audit Program "Project Conserve" was also used.

A monthly newsletter was prepared by the Regional Coordinators and sent to all involved high school teachers with a reporting card. Input for the newsletters came from a variety of sources including the Science and Mathematics Teaching Center.

Response to the newsletters was very good from the teachers. It facilitated the collection of project data and provided two way communication with the return card enclosed. Accomplishments of teachers, and students were noted as well as resource materials and energy conservation ideas.

PHASE III April 1, 1979 - May 31, 1979

During this period the Regional Coordinators continued to provide follow-up to the high school programs initiated earlier in the school year. The major model utilized was the teacher consultation model with high schools although contacts were maintained with all teachers expressing an interest in the project.

As of April which was the extension of the original project some pilot efforts were made to provide energy conservation instruction for elementary and middle school students in Regions II-V. These consisted of several classrooms per region.

Region II concentrated pilot efforts on middle schools utilizing the Family Energy Project. Region III did a combined Energy Conservation - Bicycle Program with several elementary classes in one school. Region IV concentrated on Kindergarten - Eight programming. Region V worked with elementary classrooms on an "Energy Story" model which took energy from the source to consumption. One feature was a visit to an electrical power generating plant.

The transportation audits were continued through this period but the home audits program, "Project Conserve," was dropped because others in the state were reaching the target areas.

Six new single sheet materials were developed for use with elementary students in the Phase III and Phase IV programs. The titles are as

follows:

Energy Idea Sheet (for teachers)
Family Energy Saver Contest
Energy Match
Energy Word Find
Energy Find
Energy Crossword

Response to these materials although they came late in Phase III was good.

During this period the two graduate students changed from 1/2 to 1/4 time appointments and the CES Program Leader and Secretary dropped back to 80% time on the project.

PHASE IV June 1, 1979 - August 31, 1979

During this final phase of the Cooperative Extension Services' part of the contract two of the four field positions, Region IV and V were terminated as well as both graduate student positions.

The primary emphasis during this period was summer energy programming at camps, day camps, recreation programs, and fairs. Outdoor active type programs were used wherever possible. Activities like an Energy Scavenger Hunt and solar cooking were used. The Quiz Boards and single sheets used in Phase III were also utilized.

Driver education programs utilizing energy resource materials were strong in both Regions II and III. The Orchard View High School class in Muskegon had a 34% decrease in driving during the conserve week.

Other than driver education most of the youth reached were elementary and middle school students.

GENERAL COMMENTS

The Youth Energy Project over the course of 21 months trained over 1086 teachers and provided energy conservation education to 52,310

*Estimated for the last month of the project because there appeared to be no convenient way to collect September students reached.

youth. A total of 2,412 transportation audits were processed and sent to families. The potential motor fuel savings per family increased from an average of $312 in April, 1978 to $500 in August, 1979, due to increased fuel costs. There were 923 Home Audits processed and computer printouts distributed to families.

2. Science and Mathematics Teaching Center Programming

Materials for teaching energy education in the secondary classroom were selected so that teachers would develop instructional leadership, competence in planning, implementing, and evaluating energy education curricula. Furthermore, as the secondary education curriculum is already oversubscribed and overloaded we consider it essential to generate teacher competency for infusing energy education into subjects that are well established components of the curriculum. (Science and social science curricula would appear to be the most obvious "hosts" for energy education).

Energy education can encompass a wide variety of materials, concepts and ideas, ranging from an awareness of the very basic science concepts of energy and it's sources to the more exotic technologies such as geothermal, tidal, wave, and wind energy. The selection of materials was guided by the principle objectives of the Youth Energy Project (YEP). Consequently, many materials were excluded that might be normally included under energy education; in particular, we avoided alternative energy sources, excluded many basic energy concepts and used a less than rigorous definition of energy.

During the 1978 calendar year, teacher workshops on energy education were designed around six specific objectives.

a. To acquaint teachers with the rationale and objectives of the total Y.E.P.

b. To train teachers in ways of assessing students in terms of the second and third principal objectives described on page 1.

c. To provide background knowledge of the relative merits of various conservation practices in the home and in transportation.

d. To provide knowledge of and practice in use of the resource materials for students in conservation practices.

e. To provide knowledge of, and the justification for, particular energy conservation ethic for this project.

f. To provide knowledge of various methods by which students could be aided in considering an energy conservation ethic.

The original services to be performed by the SMTC included:

1. The training in energy conservation teaching curriculum for 120 teachers and 30 4-H volunteer leaders and staff members.

2. Training for teacher trainers.

3. Training in the conduct of 4-H energy conservation project activities for 60 teachers, curriculum consultants, volunteer leaders, and 30 teens.

Originally the contract called for the Cooperative Extension Service to develop the classroom activities and curriculum in energy conservation to be provided to approximately 13,700 high school students and 140 teachers. It became apparent that the Cooperative Extension Service did not intend developing these materials. The first revision of the program resulted in the SMTC staff assuming the task of assembling a curriculum material and background information packet for teachers and students. This was negotiated between Drs. Lowell Rothert and Martin Hetherington. Further complications in the development of these materials were that we were funded late and the materials had to be developed under a very short timeline. Nevertheless, the SMTC developed that packet on time and it was available for teachers in the workshops. Nine workshops were conducted--three in each of the counties, Calhoun, Ingham, and Jackson.

Following the teacher workshops in the three counties, the EES staff met with Cooperative Extension Service and SMTC staff to re-negotiate the summer program. It was decided not to conduct a leadership workshop at that time, but to instead conduct two week-end type workshops for teachers--one at Higgins Lake and one at Walden Woods. In addition, EES funded the development of a film-strip on Energy and Doubling Time.

Again the program was revised to run a series of ten workshops in the fall--two in each of the five regions. In addition, we conducted two follow-up conferences for the participants from Region I that attended either of the two summer workshops. Separate workshops were conducted in Garden City and Flint because of the huge demand. The SMTC later contracted to develop a modular teaching unit on the concept of net energy.

During the fall, we also conducted a follow-up program for Region I teachers which included the "News from the Energy Paradocs" newsletter and phone calls and other assistance as needed. We supplied each of the 4-H coordinators with a "Dear Energy Paradocs" column for inclusion in their own newsletters.

Finally, the SMTC contracted for a six month extension of the project which included the development of a packet for teachers at the elementary and middle school level; the packet was tested with a pilot group of teachers in April. These materials were then revised with additions with the goal of conducting a weekend type workshop at Higgins Lake with elementary teachers during the summer.

The Center also contracted for five workshops in September, one in each of the five regions, to be conducted for elementary teachers. For the summer workshop, the spring workshop, and each of the five

workshops in September for elementary teachers, recruitment was handled by the Science and Mathematics Teaching Center. In all other workshops recruitment was handled by 4-H.

In summary form the ultimate role of the Science and Mathematics Teaching Center was charged as follows:

a) Design classroom activities in addition to Extension Service materials.

b) Conduct nine leadership workshops in spring 1978 three each in counties Calhoun, Ingham, and Jackson.

c) Conduct two workshops for teachers at Higgins Lake and Walden Woods, summer, 1978.

d) Conduct ten regional evening teacher workshops in energy education in the fall of 1978.

e) Conduct two follow-up meetings with the Region I participants.

f) Develop a filmstrip, student booklet and Teacher's Guide on the concept of Doubling-Time related to energy use.
(Further contracts relate to the Proposal Extension, March 5, 1979).

g) Develop materials for a Net Energy project for secondary students.

h) Write "Dear Energy Paradocs" newsletters.

i) Develop elementary level materials in energy education which included:

i) A 1979 Spring Workshop for Elementary Teachers,

ii) Improvement of the student materials using SMTC elementary teacher consultations,

iii) A Summer Workshop for Elementary Teachers held at Higgins Lake, and

iv) Five 1979 Fall Teacher Workshops.

All responsibilities of the SMTC were completed on schedule.

Details of these accomplishments follow in sections A - E.

A. THREE MODELS OF ENERGY EDUCATION TEACHER WORKSHOPS FOR SECONDARY TEACHERS

The three workshop models were designed at the beginning of the project; the first model provided feedback upon which the second and third models were improved.

The first workshop model was designed so that:

a. The workshops would be conducted in the closest geographical region to MSU Region II (i.e., approximately within a 75-mile radius of campus).

b. Both 4-H and secondary teachers would attend.

c. The workshops would be repeated three times at three different locations (three workshops per location) so that the workshop presentors would travel rather than the participants.

d. The first two workshop sessions had a high input of methods and materials and were only two weeks apart. The third workshop sessions were three weeks after the second workshop session; this time interval allowed participating teachers to use the materials with students and provide feedback to both ourselves and other workshop participants.

e. Changes could be made from workshop to workshop as new ways were found to improve the presentations.

f. All workshops could be conducted after school from 4:00 - 9:00 p.m., with dinner provided.

The second workshop model was designed so that:

a. Two locations could be selected where the participants could be housed and fed.

b. Two groups of approximately forty teachers could be present over a 2 1/2 day period.

c. Each workshop could be designed to allow teachers to preview films and work with additional equipment such as the energy simulator and home energy calculator.

d. Involvement began with dinner at 6:00 p.m. on the first evening, and continued until noon on the third day.

e. A more leisurely approach was allowed with more time to establish rapport between instructors and participants.

f. Participants would be paid mileage to and from the workshops but were not paid a stipend.

g. Both workshops would be held in August as we have found this a good time for conducting teacher workshops.

The third workshop model was designed so that:

a. Ten workshops could be conducted - two in each EES Region within the state of Michigan.

b. Each workshop had the same format, which was to use selected materials which were found to be most effective from the other two workshops.

c. Each workshop started after school, ran from 4:00 p.m. until 9:00 p.m., and included dinner being served on the site.

Certain aspects common to all three workshop models were:

a. Each teacher received a packet of materials to be used in their classes.

b. Each workshop was conducted by several presentors with most of the presentation being given by Drs. McLeod and Hetherington.

c. Each workshop had an evaluation which provided feedback for subsequent sessions as well as for an overall evaluation for SMTC and the Department of Commerce.

d. Teachers were recruited by the Regional Coordinator of the Energy Extension Service/Cooperative Extension Service (EES/CES). The regional EES/CES coordinators were also responsible for arrangements prior to the workshops (meeting location and meals) and acted as additional consultants and resource persons for teachers following the workshops.

The detailed agenda of all workshops are presented in Appendix A.

B. ENERGY EDUCATION MATERIALS FOR SECONDARY TEACHER WORKSHOPS

The manner of conducting the three workshops models was quite different due to their different time-lines. The first two models allowed for much more participant interaction and a greater involvement with the curriculum materials. The specific purpose of such curriculum material is shown in summary form in Table I.

TABLE I. SUMMARY OF MATERIALS USED AND THEIR INTENDED PURPOSES

To Develop an Energy Conservation Ethic	To Conserve Energy in the Home	To Conserve Energy in Transportation
"Energy and Doubling Time"	"The Household Energy Game"	"Going Places" (Transportation Choices and Oil Supplies)
"Energy Dilemmas"	"Energy Conservation in the Home"	
"U.S. Energy Policy--Which Direction?"	"Save Energy, Save Dollars"	"How A Bill Becomes A Law to Conserve Energy"
"Energy Charts and Graphs"	"Calories for Heating our Homes"	
	"Family Energy Project"*	

*Used in a portion of the workshop, 1978. These materials were not amended by the SMTC staff.

The curriculum materials packet assembled by the SMTC staff for the workshops are as follows:

1. Educational and Curriculum Materials - Grades 9-12. Energy Extension Service (EES), 6520 Mercantile Way, Suite 1, Lansing, MI 48910.

   A list of free secondary level educational materials available from the Energy Extension Service - Energy Information Clearinghouse.

2. Energy Conservation in the Home - 1977, University of Tennessee, 319 pages. Copies available from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

   An Energy/Education Conservation curriculum guide for Home Economics Teachers covering such subject areas as residential energy, energy and the environment and energy in food, entertainment and personal care. It outlines America's energy consumption, defines energy and its various forms and provides energy activities. Also available from EES Clearinghouse. See #1. Cost: free.

3. Family Energy Project - Grades 9-12, 1978, Energy Extension Service, 34 pages. See #1.

   Developed for home and transportation energy conservation, this two-part curriculum guide provides task-oriented activities for the students as well as their families that actually allow the students to conserve energy while learning. It is designed for students who have a minimal background in energy and can be easily incorporated into any high school subject area curriculum. Cost: free.

4. The Household Energy Game - 1974, University of Wisconsin Sea Grant College Program, 1800 University Avenue, Madison, Wisconsin 53706. 20 pages.

   Concentrating on transportation, home heating and cooling and electrical appliances, this self-help booklet in a game design gives you an idea of how much energy you actually use and how you can manage it more effectively. The game is divided into two parts. Part I helps you

construct your current energy budget, and Part II offers suggestions on how you can alter your budget to conserve energy and also save money. Cost: 15¢ each.

5. Energy Dilemmas - 1977, League of Women Voters of the United States, 1730 M Street, N.W., Washington, D.C. 20036. 39 pages.

An extremely comprehensive booklet on the energy situation. Focusing on the political, social and economic issues associated with energy, it relates the energy history of the United States and outlines the energy crisis. It presents a series of value-laden energy questions, emphasizes the key points of view, and clarifies the issues, allowing the reader to define their own values and choices. It is designed "to offer the non-expert a brief, balanced introduction to our energy dilemmas." Cost: Dependent on quantity, 50+ = 60¢ each.

6. Energy Options - 1977, League of Women Voters of the United States, 1730 M. Street, N.W., Washington, D. C. 20036. 54 pages.

Energy Options examines the supply and demand of currently used fuel sources and outlines alternate energy sources. It explores the complex political realm of energy policy-making and examines government's role in determining an energy policy. It is a companion booklet to Energy Dilemmas. Cost: Dependent on quantity, 50+ = 60¢ each.

7. How A Bill Becomes A Law To Conserve Energy - Grades 9-12, 1977.

Study units include "Case Study of a Bill," which describes how the 55 mph national speed limit became a law and takes the student through the law-making process; and "A Congressional Hearing" in which students play typical roles at a hearing on a national speed limit bill in a simulation game. (See also, "U.S. Energy Policy - Which Direction?") Cost: Free.

8. Agriculture, Energy, and Society - Grades 10-12, 1977, 36 pages. Available through EES Clearinghouse. See #1.

Interdisciplinary unit helps students examine the nature of present-day agriculture methods and study the impact of these methods on existing resources. Cost: Free.

9. U.S. Energy Policy - Which Direction? Grades 11-12, 1978, 90 pages. Available through EES Clearinghouse. See #1.

This unit, which is a companion to "How A Bill Becomes A Law To Conserve Energy," concentrates on the executive branch of

the government and the various forces that go into making energy policy. (Field Test Draft). Cost: Free.

10. Energy and Doubling Time. McLeod, R. Booklet and Filmstrip. Science and Mathematics Teaching Center, Michigan State University, East Lansing, Michigan, 1978. (Booklet $.50 per copy; Filmstrip $10.18 per copy), (Supported by U.S. Department of Energy, Grant No. EC-77-6-01-7092).

The booklet and filmstrip describe the situation encountered by a mythical creature, the snarf, which reproduces every minute and which eats only a rare material called ortep. This material explicitly describes that our energy use has been and still is following the rules of doubling time, just like the snarf and its use of ortep.

11. Energy Charts and Graphs. Unpublished manuscript, Science and Mathematics Teaching Center, Michigan State University, East Lansing, Michigan, 1978. (Free while they last.)

This manuscript contains many charts and graphs, taken from a variety of sources, which provide teachers with comprehensive background material for understanding the current energy situation of the world.

Use of Materials

a) Curriculum materials and film requests were handled by the 4-H personnel.

b) Doubling Time Filmstrip requests were also handled by the SMTC.

--110 copies were sold.

-- 63 copies were loaned.

Newsletters

The Newsletter information was of two types, Energy Paradocs and an Energy Paradocs column for the 4-H regional publications. Examples of these newsletters are to be found in Appendix B.

Film Evaluations

In the summer workshops, approximately one dozen films on energy related issues were reviewed by the teacher-participants.

C. DEVELOPMENT OF THE NET ENERGY CURRICULUM MATERIALS

The concept of net energy becomes increasingly useful as

demand for fossil fuels increases and the more easily obtainable reserves become depleted.

Society must invest energy in terms of equipment, transportation, and technology in all recovery processes, whether mining for coal, drilling for oil or raising crops. If more energy is delivered than is invested, then there is a net energy gain. The concept of net energy is defined in three different accounting methods; for the purpose of this project we used one definition described by the Colorado Energy Research Institute[1] which is consistent with that used by Koenig[2]. Net energy is the ratio between the amount of energy obtained or delivered and the amount of energy invested. The usefulness of the net energy concept can easily be seen by considering the case in which the amount of energy invested is equal to the total energy obtained. The net energy in this case would be one and, of course, there would be no advantage in developing the resource. As scientists and engineers search for energy resources that are harder and harder to obtain, and as agricultural researchers attempt to produce increasing quantities of food from available farm land, the net energy concept becomes extremely important in determining whether the amount of energy return is great enough to justify the energy invested to obtain the resource. Understanding the

---

[1] Colorado Energy Research Institute, Net Energy Analysis: An Energy Balance Study of Fossil Fuel Resources. National Technical Information Service, U.S. Department of Commerce, Springfield, VA. April, 1976, pp. 11-20, 11-21.

[2] Koenig, H. E. Energy Conservation: Imperative and Opportunity. A paper prepared for Energy Seminar for Michigan Legislators and Staff. Lansing, Michigan. September 11, 1978, p. 11.

concept of net energy, therefore, will help secondary students comprehend many of the present-day debates and discussions concerning energy problems as society struggles in adjusting to the dwindling supply of conventional energy sources.

In order to effectively teach the concept of net energy we developed a modular unit approach (see Figure 1) which provides a necessary structure for students and at the same time offers considerable flexibility for both teachers and students. The net energy unit was designed to be more or less a self-contained segment of learning beginning with an introductory module (I-1) followed by a number of required (R1, R2, R3) or alternate modules (A1, A2, A3, A4, A5). Each module has been designed to be taught in one or more class periods. The organizing theme of all the modules within the unit is net energy, and the alternative modules apply the net energy concepts to a variety of situations. The introductory module presents the prerequisite concepts necessary for the alternative modules which are designed to provide a variety of routes for acquiring an understanding of the concept of net energy. For the alternative modules, students can work in small groups or individually, and, depending on interest, some students may complete more modules than others. A decision making module, Conservation, summarizes and interrelates the major ideas presented in previous modules.

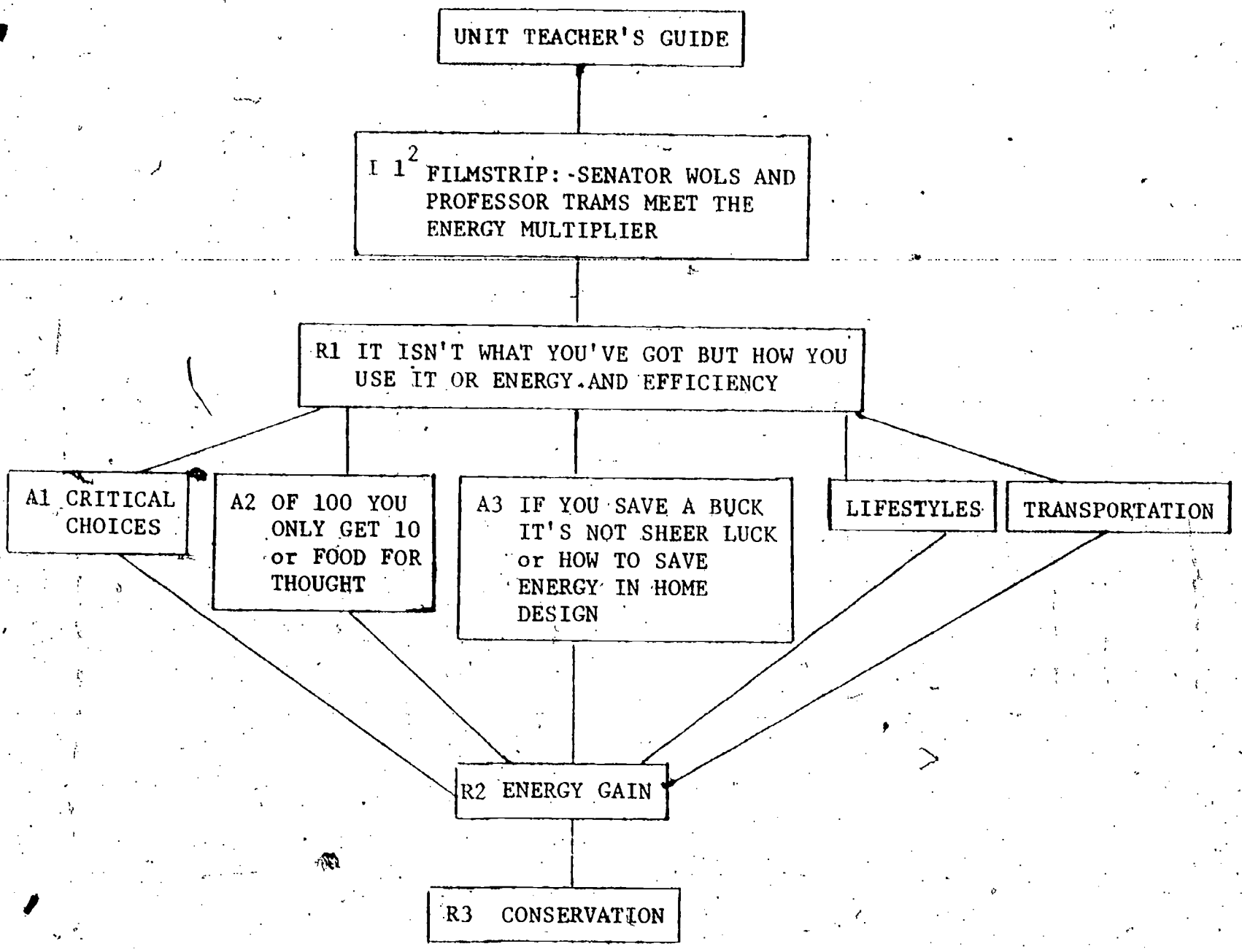
Overview of Modules

1-1 Senator Wols and Professor Trams Meet the Energy Multiplier

This introductory module consists of an animated filmstrip with sound. The filmstrip is designed to acquaint the students

Fig. 1

A Net Energy Unit[1]



1. The format for this modular unit approach is adapted from the "FUSE Modular Unit" teaching approach as described in PRISM II, 1974 by B. Showalter.

2. I - Introductory Module
   R - Required Module
   A - Alternative Module.

3. Some of the modules contain published activities already in use and these have been given appropriate credit in each module.

with the basic concepts of net energy including the concepts of energy gain, energy growth, and the relationship between the two. The snarf, a mythical creature first presented in the filmstrip "Energy and Doubling Time", is again presented in this filmstrip; the snarf reproduces every minute and eats only a rare material called ortep. The most important point made in the filmstrip in this module is that we must begin to think more carefully about the amount of energy that must be invested to provide energy.

R-1 It Isn't What You've Got, But How You Use It or Energy and Efficiency.

Many of the basic ideas necessary to understand other modules are represented in this required module. The ideas of interaction and system, frequently used in both science and social studies, are first introduced and these ideas are then used to introduce the concept of energy. The development of the concept of energy includes energy source, energy receiver, energy transfer, energy chain, and efficiency.

A-1 Critical Choices

This module helps students evaluate their values regarding energy conservation and daily energy use. Four Values Clarification activities help teacher and students become more aware of the attitudes and values they possess with regard to energy conservation and daily energy use.

A-2 Of 100 You Only Get 10 or Food for Thought

This module consists of three activities and an evaluation; each part can be conducted in the classroom or completed individually as homework. The first activity introduces the students to food chains and energy transfers between trophic levels in in natural food systems and acquaints the students with their

position in food chains. The second activity explores the energy inputs and outputs of the U.S. food system and gives the students the opportunity to locate the energy inefficiencies in the system. The third activity relates the financial cost of the energy intensive food system to the consumer. An evaluation section allows the student to suggest possible ways of decreasing the energy consumption of our food system.

A-3 If You Save a Buck, It's Not Sheer Luck or How to Save Energy in Home Design

This module is designed to provide students with a better understanding of factors involved in home design which relate to energy consumption. The many aspects of home design related to energy consumption are presented in the form of a short game which allows two individual players (or two pairs) to simulate how they might control their use of energy expenditure in the home. The game is designed to take approximately twenty minutes of class time which allows ample time for class discussion.

A-4 Life Styles

The purpose of this module is to help students understand that today and in the future, net energy will influence their lifestyles. The five activities in this module include a science fiction story, an interview with a person of retirement age, a projection into the future based on lifestyles and energy usage in the past, the energy involved in the life history of a phonograph record from petroleum products to trash can, and a dramatization of a future energy scenario.

A-5 Transportation

This module helps students comprehend the costs involved in various modes of transportation in terms of both dollars and

energy. The module consists of four activities: dollars saved carpooling to school, reduction of gasoline consumption without carpooling, a comparison of inter-city and urban transportation using different modes of transportation, and the maintenance of a vehicle to obtain maximum possible mileage. The first two activities introduce transportation at an everyday level which leads into the more complex issue of net energy dealt with in the third and fourth activities.

R-2 Energy Gain

This module gives additional insight into the concept of energy gain. In particular, it focuses on the end-point use of energy as a determinant for the kinds of sources needed. The first activity presents a simple fireside scene and asks the students to list the kinds of energy needed to make the scene possible. The module then examines the energy gain from different kinds of fuel sources such as fossil, nuclear, and solar. The second activity asks students to identify uses of energy in the home and school and to evaluate whether such uses can be eliminated or supplied by alternative energy sources such as solar.

R-3 Conservation not Conversation (or More Action and Less Talk)

This module focuses on the highest energy gain system of all - conservation measures. Students are asked to list conservation measures which can be made in their home and in their personal transportation, and to determine the gain associated with each conservation measure. Finally, as a group they are asked to consider conservation measures in terms of the effect on their lifestyle. An optional activity includes a publication such as a newsletter to the community that would increase public awareness

of conservation measures that can be made and the relative pay off.

Summary

As sources of energy, either as fossil fuels or as food, become more difficult to develop, the need for a careful analysis of how this energy is obtained becomes increasingly apparent. The overlying concept of these secondary science-social studies modules is net energy which has been defined as the ratio between the amount of energy delivered and the amount of energy invested.

Many of the current debates on the relative value of utilizing solar, nuclear, or wind energy as alternatives to fossil fuels relate, among other issues, to the concept of net energy. A calculation of net energy is required in supply-oriented decisions such as the evaluation of the energy involved in the development and operation of a coal field as opposed to combined petroleum use with additional solar energy. A knowledge of net energy is essential for use in demand oriented decisions such as the evaluation of the optimal quantities of insulation to install in residences.

This modular unit on net energy will help provide teachers and students with a concept which has far-reaching implications in individual lifestyles and as voting members of an informed electorate. By being presented in modular form, the unit can be taught in a manner better related to the classroom, school, and environmental setting.

D. ELEMENTARY TEACHER WORKSHOPS

(a) Science and Mathematics Teaching Center, Spring, 1979.

The elementary teachers were recruited for the workshop by a letter sent to elementary schools in Region II. Twenty-five teachers were selected and two days before the workshop each recruited teacher's attendance was confirmed by phone

or by personal contact. Some suitable energy education materials already in existence for elementary grades were selected for use in the workshop; additional materials (see below) were developed by the staff. The Science and Mathematics Teaching Center employed an artist (Bill Draper) and two graduate students (John Caldwell and Nancy Landes) to help develop the materials. The workshop, conducted on April 26 at the Science and Mathematics Teaching Center, was attended by nineteen elementary teachers.

1. Take Home Activities for NSTA materials used in the workshop.

Energy Conservation at home is the main theme of these take-home activities. The residential sector uses approximately 37% of all energy in the United States at home and in private cars. These facts present both a great opportunity and a great need for conservation of energy in the home and in personal auto use.

While students may learn about conservation measures at school, they need to learn to apply those measures where the most difference can be made--at home with their families. With the teacher's help, we hope to encourage home energy conservation by asking the students to work with their families on the activities provided. Included in the "take-home" packet were a sample letter to be sent home to parents explaining the focus of the activities, teacher materials (printed on the yellow pages), and student activity pages (printed on white paper). The teacher pages were meant to serve as a guide to each take-home activity. Each activity accompanies one of the NSTA

energy units which were given to the teachers at the energy education workshop. The student pages were included as reproducible worksheets to be sent home with each student. The sample letter to parents may be reproduced as it is or may be modified to fit particular needs in completing activities. Our goal was to encourage family participation through these activities since both students and parents (as well as other family members) can be "energy educated" by working together on these conservation activities.

2. Energy Posters for Lower Elementary--"A Trip to the Beach".

This set of six posters presents a picture story to be used with students; the story is about people and their uses of energy. The objective of the story is for students to think about ways to use less energy, recognize that all jobs are dependent on energy, and that energy is used by everyone. Teachers can either read the story that is printed on the back of the cards or can have a student(s) read the cards.

The suggested procedure was as follows: Read the story through once, then ask the students, "What do you remember about the story; Where is energy being used?" When the students suggest a particular incident where energy is being used, remove the card indicated and ask, "Where in this picture is energy being used? or "Who is using energy and what for?" Continue to probe as long as interest persists.

Once the students have exhausted the examples of energy use, repeat the procedure with another card. For upper level students (fourth grade or above) ask for ideas how they could go on a picnic at the beach and not use as much energy.

(b) Workshop Follow-up and Summer Writing Consultations

During the month of May, 1979, the SMTC staff visited 10 of the elementary workshop teachers who indicated they have been teaching energy education. One teacher had shared her materials with two other teachers in her school who did not attend the workshop. The energy education lessons taught ranged in time from one lesson to two weeks; most observed teachers taught energy for three or more lessons. The topics ranged from What is Energy? to Energy Alternatives; each teacher had at least one lesson on energy conservation. From this group of teachers four teachers were selected to write additional energy education materials during the summer. These teachers consulted with SMTC staff throughout the summer.

(c) Higgins Lake, Summer 1979

The workshop was held in August as we have found this to be a good time for teachers to participate. Approximately 40 elementary teachers were housed and fed over a weekend period from 6:00 p.m. Friday to noon on Sunday, while receiving approximately 16 hours of instruction. An approach was taken which allowed time to establish rapport between instructors and participants. Participants were paid mileage to and from the workshops but were not paid a stipend.

(d) September Workshops, 1979

Five workshops were conducted--one in each EES Region--within the state of Michigan. Each workshop used selected materials which were found to be most effective from the Spring and Summer workshops, ran from 4:00 p.m. until 9:00 p.m., and included dinner being served on site.

As with the Spring and Summer workshops, each teacher received a packet of materials to be used in their classes, and each workshop was conducted by several presentors with most of the presentation being given by Drs. McLeod and Hetherington, who were also responsible for all recruitment of teachers.

Workshop agenda are presented in Appendix A.

E. ENERGY EDUCATION MATERIALS FOR ELEMENTARY TEACHER WORKSHOPS

The curriculum materials distributed in the workshops were as follows:

1. Educational and Curriculum Materials - Grades K-12.

   Energy Extension Service (EES), 6520 Mercantile Way, Suite 1, Lansing, MI 48910.

   A list of free elementary, middle school and high school educational materials available from the Energy Extension Service--Energy Information Clearinghouse.

2. Energy Conservation in the Home - 1977, University of Tennessee, 319 pages. Copies available from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

   An Energy/Education Conservation curriculum guide for Home Economics Teachers covering such subject areas as residential energy, energy and the environment and energy in food, entertainment and personal care. It outlines America's energy consumption, defines energy and its various forms and provides energy activities. Also available from EES Clearinghouse. Cost: Free.

3. Energy Dilemmas - 1977, League of Women Voters of the United States, 1730 M. Street, N.W., Washington, D.C. 20036. 39 pages.

An extremely comprehensive booklet on the energy situation. Focusing on the political, social and economic issues associated with energy, it relates the energy history of the United States and outlines the energy crisis. It presents a series of value-laden energy questions, emphasizes the key points of view, and clarifies the issues, allowing the reader to define their own values and choices. It is designed "to offer the non-expert a brief, balanced introduction to our energy dilemmas."
Cost: Dependent on quantity, 50 + = 60¢ each.

4. Energy Options - 1977, League of Women Voters of the United States, 1730 M. Street, N.W., Washington, D.C. 20036. 54 pages.

Energy Options examines the supply and demand of currently used fuel sources and outlines alternate energy sources. It explores the complex political realm of energy policy-making and examines government's role in determining an energy policy. It is a companion booklet to Energy Dilemmas. Cost: Dependent on quantity, 50 + = 60¢ each.

5. The Energy We Use - 1977, Grade 1, 42 pages, available through EES Clearinghouse. (See #1)

This packet contains a set of nine lessons that are closely related to the traditional curriculum for this grade level--Me, My World. In this unit children discover that energy is one of the links between themselves and everything else. Here, in these lessons, children examine things such as cereal grains to learn about food energy; make clay dinosaurs to get some beginning ideas about the formation time of coal, oil, and natural gas; and become part of a pinwheel parade showing the energy in wind. Chapters: Energy Provides Heat, Light, and Motion, Energy from Food, Energy is All Around, Energy from the Sun, Fossil Fuels Have to be Burned to Let Energy Out, The Energy in the Wind, Energy in Moving Water, Energy Conservation, The Best Present of All.

6. Community Workers and the Energy They Use - 1977, grade 2, 80 pages, available through EES Clearinghouse (See #1).

The activities in this packet are intended to stimulate the child's curiosity to know more and to grasp relationships through a blending of ideas about energy with a study of the effect of the use of energy on the livelihood of people in the community. Community workers are classified under three headings: 1) Community Workers Who Work Directly with the Sources of Energy: farmer, grocer, baker, oil man, gasoline station attendant, meter reader; 2) Community Workers Whose Work Depends on a Continual Supply of Energy: transportation worker, truck driver, electrician, telephone linesman, installer, and repairman; 3) Community Workers Who Make Decisions About Energy: local government officials.

7. Energy and Transportation - 1977, grade 3, 89 pages, available through EES Clearinghouse (See #1).

Transportation, the movement of people and things from place to place, is one of those aspects of modern living so familiar to most young children that they are likely to take it for granted. The idea of this unit is to help students develop a conscious appreciation of the variety of transportation modes, past and present, and to assist them in understanding some of the ways that modern transportation systems affect their world. Topics include: discussion of transportation, refining crude oil, energy in cars, systems of transportation, cost effectiveness of different types of transportation, investigation of pollution of transportation vehicles, and the history of transportation and how that relates to present and future uses.

8. Networks: How Energy Links People, Goods and Services- 1978, grades 4 and 5, 102 pages, available through EES Clearinghouse (See #1).

The lessons in this unit develop the network idea around a simple electrical distribution system and further consider electrical energy itself. The network idea in the later lessons emphasizes the interdependence of the man-made network for producing and distributing electrical energy and the natural ecological network. Lessons include: A Working Electrical Circuit, Networks Underground, How does Nature Help Us Get Electricity?, Here's Energy Changing, How Our Need for Coal Affects the Environment.

9. Bringing Energy to the People: Washington, D.C. and Ghana - 1978, grades 6 and 7, 63 pages, available through EES Clearinghouse (See #1).

This unit covers two areas of study: 1) energy is a basic need in all cultures, and 2) energy use affects the way people live. In this unit students will be able to compare Ghana with the Washington, D.C. area in terms of climate, geographic location, energy dependency, and services that help people meet their needs. Lessons include: A Geographical Picture of Two Cities, Tracing the Sources of Electric Power in Ghana and in the Washington, D.C. Area, Two Transportation Systems, and How is Electricity Used in Two Different Cultures?

10. Energy, Engines, and the Industrial Revolution - 1977, grades 8 and 9, 82 pages, available through EES Clearinghouse (See #1).

This unit examines some of the broad social and economic upheavals that took place during the Industrial Revolution. It calls special attention to the role of energy in this dramatic period of history which ushered in our own technological age. Topics include: An industrial revolution student reader, 1700-1860 with a focus on energy, energy conversions that take place in an automobile, consideration of the heat engine, industrialization in national and urban life, the effects of a major change such as the industrial revolution on the daily lives of people.

11. Transportation and the City - 1977, grades 8 and 9, 46 pages, available through EES Clearinghouse, (See #1).

This unit tells why and how American small towns declined as a result of the availability and acceptance of automobiles, and it tells of the growth of suburbs and their effect on the city. The learning activities in this packet have been designed to fit into existing segments of instruction in U.S. history and civics courses at the middle school level. Lessons include: Buying a "Dream Car," studying the effects of the car-for-everybody on the American small town, Los Angeles--the city that a car built, and students simulate a court trial on the charge: the car has done permanent injury to humanity--innocent or guilty?

12. Energy and Doubling Time. McLeod, R. Booklet and Filmstrip. Science and Mathematics Teaching Center, Michigan State University, East Lansing, Michigan, 1978. (Booklet $.50 per copy; Filmstrip $10.18 per copy), (Supported by U.S. Department of Energy, Grant No. EC-77-6-01-5092).

The booklet and filmstrip describe the situation encountered by a mythical creature, the snarf, which reproduces every minute which eats only a rare material called ortep. This material explicitly describes that our energy use has been and still is following the rules of doubling time, just like the snarf and its use of ortep.

13. Energy Charts and Graphs. Unpublished manuscript, Science and Mathematics Teaching Center, Michigan State University, East Lansing, Michigan, 1978. (Free while they last).

This manuscript contains many charts and graphs, taken from a variety of sources, which provide teachers with comprehensive background material for understanding the current energy situation of the world.

14. A Trip to the Beach - 1979, 6 Story Posters (11 x 17 inches) Science and Mathematics Teaching Center (See #12). (Supported by U.S. Department of Energy, Grant No. EC-77-6-01-5092).

For a description see page 28.

15. Take Home Activities (to accompany materials listed as #6-10). 1979, Science and Mathematics Teaching Center (See #12). 31 pages. (Supported by U.S. Department of Energy, Grant No. EC-77-6-01-5092).

For a description see page 27.

16. BTU* Teacher Developed Energy Materials for Elementary and Middle Schools - 1979, grades K-8. Science and Mathematics Teaching Center (See #12). 159 pages. (Supported by U.S. Department of Energy, Grant No. EC-77-6-01-5092).

This curriculum package contains 17 activities developed by practicing elementary/middle school teachers. The lessons

deal with various energy topics but impress upon students the need for conservation. Activities cover many curriculum areas including social science, art, language arts, and science. Modes of presentation include games, posters, a flannelboard story, worksheets, discussion, art projects, stories, and take-home activities.

III. SUMMARY REPORT

a) Review of Relevant Educational Innovation Dissemination Literature. (See Appendix C).

b) Complete Summary of Achievement of Milestones. (See Appendix D).

c) Complete Summary of Achievement of Rates of Service Activity. (See Appendix E).

d) A Narrative Review of the Start Up Problems Which Occurred in Each Region.

General Discussion of Start Up Problems

1. The delay in final funding for the program was such that recruitment was severely hampered and the development of the materials took place on a very short timeline. To sign a contract in late January to develop materials, design a workshop, and recruit teachers for a program beginning in February is unrealistic.
2. The timing was inappropriate for introduction of new materials into the schools. By the time the workshops began, the school year was already firmed up for many teachers.

4-H Component

Region 1

Since no staff person was hired for Region I, there was no immediate start up of programs in this area. There was a gradual start up with recruitment of teachers for summer 1978 workshops. The recruitment by mail for these workshops was no real problem although thousands of flyers were distributed to recruit approximately fifty teachers. The major problem in Region I was not

having a staff person assigned for follow up and sustained contact. Since Region I, which is Southeast Michigan, is a very metropolitan area, much more could have been done in the area of energy conservation education.

Region II

The coordinator started January 1, 1978, and was eager to get started with contacts in the Region. She felt stymied because the Energy Extension Service had not provided written contact to school administrators in the region and did not permit visits until after official contact had been made. She felt this prevented her from having the maximum lead time in recruitment of teachers. (See Start Problems in Implementing Teacher Training Model later in this section).

Region III

The initial candidate selected for the position turned down the job after taking the physical and being processed by the University. Another candidate who was initially interviewed was selected within a matter of days and started work the first week of January, 1978 so no real delay took place in start up. The employee's newness to this type of work presented some frustration, but the support of the local Cooperative Extension Service staff and others on the project team helped her through a somewhat difficult period. This region had a large number of schools with high enrollments and a large geographic area which presented the coordinator with a lot of travel. The original selection of the region could have been a better match of counties to eliminate some of this lengthy travel.

Region V

There was a delay in the selection of a candidate to fill this position. The major problem was that it was a 60% position and it

was extremely difficult to locate a well qualified candidate who would take this position on a part time basis. The region included six counties, and demanded a lot of long distance travel. On February 15, which was one and a half months into the project, a coordinator was hired for this region. Once the coordinator was aboard, the program moved ahead quite rapidly. Some of the experiences in the other regions were helpful in getting this region started.

Region V

A coordinator was hired and started on January 1, 1978. This region was located 450 miles from the state capitol making it quite remote in many ways. One of the problems was establishing a teen awareness team model initially in this region. The coordinator, who was new to this type of programming, had some organization problems. There also was some feeling by the Cooperative Extension staff that this position might have been better placed in a county office rather than in the Upper Peninsula Regional Office in order to be more in touch with local communities and programming. At later stages in the project, this linkage was better established with the three county Extension Offices.

Start Up Problems in Implementing the Teacher Training Model in Region II.

4-H Position

It was not clear to SMTC staff who had the responsibility for the development of curriculum materials for Region II workshops to be held in the Spring of 1978. The implementation plan did not clearly identify this responsibility. The 4-H staff feels this was a joint responsibility. Evidence of this is $7,500 budgeted for consumable supplies and $500 for printing and publishing in the original SMTC budget. Furthermore, the

SMTC component part of the EES contract stated:

--Development and delivery of a series of three workshops for teachers and 4-H staff members in each of three counties; Ingham, Jackson, and Calhoun, prior to April 30, 1978. Each of the nine workshop sessions will consist of approximately five contact hours and will be directed toward achievement of Outcome Objectives 1 and 2.

--Preparation of a packet of instructional materials consisting of background materials for teachers and activities for use in the classroom relating to Outcome Objectives 1 and 2. This packet will consist of not less than 25 pages and will be available for use by August 1, 1978.

It is difficult to comprehend the development of a series of workshops without gathering or developing appropriate resource materials. This was seen as a joint responsibility and Maureen Compton, a 4-H Graduate Assistant, was loaned for several weeks to SMTC to assist on this task.

SMTC Position

Concerning the 4-H position on page 36, the SMTC clearly understood the contract provision to develop and deliver a series of three workshops prior to April 30. We also understood that we were responsible to devleop and deliver a packet of instruction materials by August 1 for the proposed August Leadership Workshops. However, the implementation plan, page 4, called for the delivery of "Classroom Activities and Curriculum on Energy Conservation to be provided to approximately 13,700 high school students by 140 teachers." The delivery mechanism was stated to be the CES staff and 4-H leaders. The SMTC staff was only designated as the delivery mechanism for the Related Technical Support. Thus, the SMTC staff did not have curriculum development responsibilities for the Spring Workshops. This posed a real problem because 4-H also felt no responsibility to develop them. Through negotiation with 4-H, the SMTC, agreed to take on the additional task of developing those materials provided 4-H would loan a staff person, Maureen Compton, to assist in such duties as library research.

The coordinator for Region II really did not have any experience in recruitment, design of brochure, working with schools, etc. The SMTC worked with her in designing a brochure and in helping to contact schools; a considerable amount of time was invested by SMTC staff in contacting schools in order to boost enrollment in the three counties in Region II. One example of the problem was the coordinator scheduling a workshop in Jackson County in a school building that was a control school. Nevertheless, we were able to alleviate or circumvent some of the problems and secure a reasonable number of people to attend the workshop.

e) A Narrative Review of the Problems Which Impeded Achievement.

General

1. A very large share of the decisions affecting the program such as strategy, selection of schools, and time frames were dictated by the constraints of the evaluation of the YEES project rather than cooperatively developed.
2. The Spring 1978 Region II Workshop recruitment impeded achievement due to the lateness in getting started and the lack of experience in teacher workshop recruitment of the regional coordinator. At that period and time there were not many volunteers and teachers interested in energy conservation but there is considerable evidence to indicate that the interest may be much greater now.
3. The percentage of no-shows at workshops throughout the project was a real problem. There usually were 15 to 20% no-shows after a confirmation was made by the teacher and a reminder card sent. It is worthy of exploring solutions to this problem such as charging a small fee to increase the committment.

4. The number of teachers trained in the project were less than projected; the no-show problem and recruitment problems were contributing factors. There was also a question of definition of numbers; only those teachers attending a workshop or in-service program were counted. There were many times when a coordinator would work with a teacher for an hour or two on curriculum materials and planning--this was not included as teacher training.

5. Rates of service does not differentiate between two-hour workshops by 4-H coordinators, five-hour workshops by SMTC staff, or two-day workshops by SMTC staff. All were counted the same regardless of the duration of the training. However, the research by Wiley and Harnischfeger[1] on "Time and Task" clearly indicates that time on task is one of the most relevant predictors of success. We believe that non-differentiation of the rates of service poses a problem for subsequent evaluation that could be overcome by a different research design. For example, the evaluator's response (see Appendix G) to the research question, "Were two-day extensive workshops or one-day five-hour teacher workshops more effective in changing energy conservation ethic in youth?" was that "This question is

---

[1] Wiley, D. E. Another hour, another day: Quantity of schooling, a potent path for policy. Studies of educative processes (No. 3). University of Chicago, July, 1973. Also in Sewell, W. H., Hauser, R. M., and Featherman, D. L. (Eds.) Schooling and achievement in American society.

Wiley, D. E., & Harnischfeger, A. Explosion of a myth: Quantity of schooling and exposure to instruction, major educational vehicles. Educational Researcher, 1974, 3, 7-12.

impossible to conclusively answer because of major selection, history, staff and materials differences between the two workshop models." We believe that it should not be difficult at all to ascertain whether there is a difference in the effectiveness of the workshops. On the other hand it may be difficult to assign causality to that difference. While we recognize the difficulty in attributing causality to the two different kinds of workshops, we question the evaluator's reason for not looking for differences.

6. The rather constant interference of evaluation and research design on the project services contributed to impeding achievement. For example, after recruiting for the April 26th elementary teacher workshop, the SMTC was advised that we could not count these nineteen teachers in our rate of service because of random selection. This random selection was subsequently imposed upon the project; at no time in the extension of the contract did the rate of service have a dependency upon random selection. A similar incident occurred during the summer workshop. Brochures were already mailed and recruitment started before the evaluator mentioned random selection. Some forethought and cooperative effort among the total staff could have resulted in a service and evaluation model which would have satisfied both service and evaluation aspects of the project.

7. For the evaluation to be most effective it should be accomplished in both a formative and summative mode. Through the summer of 1978, this was, in fact, the model for the project. However, since the summer of 1978, the data collection has not been systematically shared with the program deliverers in order that modifications in delivery based on these data could be performed to develop a more effective program. This issue would appear to

conflict with "Rider G-A Statement of Working Relationship Between MSU and EES" regarding free and open communication.

8. Lots of data were collected that would have been valuable to the project deliverers for both formative and summative purposes. For example, after delivering more than 30 workshops, the SMTC staff still does not know from the analysis which materials appeared to be the most effective teaching tools!

4-H YOUTH COMPONENT

The Regional Advisory Committees were slow in being established. Region III never really truly functioned with one overall advisory committee. One problem encountered was getting volunteers--youth and adults--to travel to another county to attend an advisory committee meeting. Since most decisions were made at higher levels, most of the coordinators felt there were relatively few real ways the advisory committee could be utilized; however, some committees were able to make significant contributions to the program.

The home audit program had problems from the start. The State of Michigan was originally to print the computer cards. Printing delays and computer program problems delayed implementation until Phase II of the program. In retrospect it would have been better to eliminate the "Project Conserve" computer program and replace it with simpler and more useable forms.

It is noted elsewhere in the report that assembly programs did not produce the desired change in the energy conservation ethic. It was demonstrated in the spring of 1978 that thousands of high school students could be reached by energy assembly programs, but this plan was changed to a smaller scale, intensive program based on providing assistance to teachers. The change in program resulted in a quality program

reaching fewer youth. The original objective of reaching 50,000 students was revised to 37,097 in July, 1978. Incidentally, 39,907 students were reached in the original period of the project ending March 31, 1979.

The plan for a Statewide Conference on the Youth Energy Project to help others launch programs was cancelled. A revised plan for a total Michigan Energy Extension Service Conference was turned down by the Michigan Department of Commerce Administration. It should be pointed out, however, that the Michigan Youth Energy Project staff played a key role in the Wisconsin EES Youth/Family Energy Workshop in March, 1979.

The plan to conduct and promote energy fairs was not carried out as originally planned. Some coordinators did do energy fairs at shopping malls and county fairs but a low priority was given to this because it was felt that emphasis should be given to classroom instruction.

SMTC COMPONENT

1. The SMTC staff were unable to control the time allotment for workshops in which Ms. Nancy Leedom participated, but at the same time they were responsible for the outcome of the workshop. Specifically, the evaluator insisted that Ms. Leedom have her desire of 45 minutes in any workshop in which she participated. This was an inordinate amount of time to present her materials and caused a severe strain among the workshop staff.
2. The data that has been collected has been seemingly rather carefully selected with a bias toward the "task-oriented" materials presented by Ms. Leedom. Materials developed by

the SMTC staff were not comparatively evaluated. For example, the Doubling Time filmstrip was scored consistently high by participants on all of the workshops, yet, to our knowledge these data have never been used to indicate the usefulness of these materials in schools.

3. The SMTC staff had serious problems with the inclusion of Ms. Leedom's materials due to the emphasis given to them, particularly since they were not tested with regular classroom teachers. During their development and testing, students were called at their homes to encourage them to perform the tasks, but this procedure was not made clear to the teachers during many of the workshops. On all of the other curriculum materials that were used during the workshops, SMTC pointed out both weaknesses and strengths.

f) A Narrative Review of Management Difficulties not Mentioned in 'e' Above.

General

1. The entire project was not geared to coincide with the school year. Starting on January 1 which is mid-point in the school year is a disadvantage. Most planning for the school year is already set and it is a more difficult process than it would be at the beginning of the school year.

2. The conflict between program and evaluation was evident many times throughout the project. This was a pilot project and worthy of sophisticated evaluation, but in this project the evaluation priority created many management difficulties. This is not to say that evaluation was not important to the

project because it did aid greatly in some mid course program changes. Examples of problems posed by evaluation design were as follows:

--Strategies and schools were assigned on a random basis, not on the interest of the school systems.

--Control schools could not be offered any services although in many cases the coordinators travelled right by them. In many cases, they requested services that we could not offer simply because they were a control school. This is contrary to our Land Grant philosophy.

3. The combining of teachers and 4-H volunteers in a 4-9 p.m. workshop was not satisfactory. The 4-H volunteers have day-time jobs and generally are not able to attend a series of workshops starting at 4:00 p.m. Secondly, the content of the workshop was geared more at classroom activities than 4-H club activities; after the first nine workshops, 4-H volunteers were not intentionally included.

4. Coordinating a wide variety of people and agencies became frustrating at times but also resulted in some new positive relationships. The split responsibility between the Energy Extension Service, MSU, CES, Science and Mathematics Teaching Center, MSU Theater Department, 23 counties, and a multitude of schools made clear communications a priority.

5. The communication has also been poor regarding the kind of data that is being collected on the results of our workshops and subsequenting impact on students. It would be helpful for us to be provided with formative evaluation of materials on some rather systematic basis such that those materials which are not effective could be eliminated.

4-H YOUTH COMPONENT

1. Evaluation decisions seemed to downplay program decisions. The changing program and control schools for Phase II in Region III resulted in additional effort with questionable returns. New schools had to be oriented and started while some program schools were dropped.
2. The collection of evaluation data took a large portion of the regional coordinators time that might have been better spent in educational programming. Coordinators were asked to go back as many as four times in an effort to collect evaluation data.

SMTC COMPONENT

1. From the SMTC staff's perspective there was a problem with the overall design. No mention was made of a control group for the elementary workshops during the summer until brochures and recruitment had already started. Without consultation, a quasi-random recruitment process was sent to us by the evaluator indicating that we should reject some participants even though the workshop was not full. This procedure was unacceptable to us and subsequent discussion led to a modification. However, these problems could have been alleviated had we been given some role in helping to design the evaluation and would have been happy to help to design a mutually acceptable plan.
2. The SMTC staff also have had a communication problem with the EES which at one time escalated to the point that neither the evaluator nor the project director would accept phone calls from Drs. Hetherington or McLeod regarding some

items that they perceived as extremely important in pursuing. A chain of command had been established which for some reason could not be broken.

3. Other problems contributing to management difficulties related to the data collection and analysis; specifically we refer to Dr. W. Stevens' response to Dr. L. Rothert's letter (8/23/79). (See appendix G).

---

i) In answer to question #2 "Was the teacher workshop or the teacher consultant strategy more effective in raising the energy conservation ethic in youth?: the evaluator's answer was "student energy conservation attitudes and especially actions were significantly higher in the workshop groups than in the consultation group. This is most likely explained by the fact that consultation teachers conduct fewer class sessions (4.34) than do workshop teachers (5.20)." This particular rationale is directly supportive of our concensus that more time on task is related directly to learning--in this case attitudes. Thus, we would expect that the different intensity levels of the workshops from one hour contact to twenty hour contacts would have greatly different effects. Further, many of the consultation workshops referred to by the evaluator were thirty minutes or less while the fall workshops were five hours. Thus, one would expect, as did the evaluator, that the five hour workshops would have greater impact.

ii) For question #3 referring to task or non-task workshops, it would be expected that when teachers are given the

materials that specifically ask them to do a task, that it would lead to more of them doing that task, than if the material was omitted or presented and no mention made of doing the task. A similar question might be asked about the use of the Doubling Time filmstrip; one would expect that the filmstrip would be used more by secondary teachers who saw it than by teachers who didn't.

iii) Question #4 concerned the value of the SMTC Newsletter which had not yet been evaluated. The project objectives are of as much interest to the SMTC staff as they are to the YEES. We recognize that the ultimate responsibility for meeting these objectives lies with the project Director and the responsibility for determining the interest to which these objectives are met as the evaluators. However, the contribution of the SMTC workshops and materials is of great interest to us and the failure to systematically evaluate the effects and share that information with us has led to great frustration on a formative level.

iv) It would be most helpful to see these data for question #6 so that we could begin to sort out the differences alluded to, and to examine how large they are -- even though the data are still being analyzed it is now of no value to our improvement of materials.

v) Question #7 asked "Which workshop (two day intensive or five hour) reached more students per teacher and had more energy student contact hours per teacher?" The

evaluator's response was that the question is impossible to conclusively answer. It may be very difficult to assign causality because of the particular choice of research design but we query that the question is impossible to conclusively answer. For example, answers to questions could be provided for: "How does one justify the effectiveness of the five hour workshop against a two day workshop on a cost effective basis?" "How much less was done in a five hour workshop, and what does that mean in terms of energy savings?" "How does one arbitrarily assign cost effectiveness to such effects?"

(vi) We believe that the bias in the evaluation is illustrated in response to question #8 (b) about the relationship of attitudes to amount or type of instruction provided. The evaluator responded that the number of hours of instruction, a task oriented activity, and the number of different courses that include energy conservation all explain "approximately equal portions of the YES scores." The evaluator exposes his bias by referring only to the task oriented activity. Although the evaluator previously indicated that each of the three were equally responsible for the YES scoeres, he states "Point 2 above lends further explanation in support to the success of the "task oriented" approach which includes both assignments to save energy as well as monitoring reinforcement through meter readings."

(vii) In response to question #15 which asked "Which teaching strategies (methods) appeared to be most successful?", the evaluator again refers to the behavior management strategies embodied in the "task oriented" approach. We would be interested to know what other teaching strategies were observed or inferred.

(viii) In answer to question #16 "Which materials appeared to be the most effective teaching tools", the evaluator's comment was that the analysis was not complete at the end of this project. Although the analysis may not be complete it would be hoped that on a project of this scope that whatever analysis can be done should be systematically shared with the deliverers in order to make the total project as effective as possible.

g) A Listing of at Least Ten Recommended Procedures for Interfacing With Public, Private, and Intermediate Schools During Future Energy Education Projects

General

1. Develop personal contact with administrators of the intermediate school districts and the schools to be involved in the program. This means personal contact with principals and teachers.
2. Establish a quality newsletter to go to teachers and administrators that communicates what the program is and what it is doing and also recognizes the individual efforts of teachers within the various school systems.
3. Development of a two way communications system with teachers involved in the program to include written and verbal communication to the teachers and written and verbal communication feedback from the teachers. This system should have an easily accessible way for the teacher to get in touch with the program.

staff to request additional help and/or materials.

4. More specific subject matter curriculum materials geared at individual grade levels needs to be developed and utilized.

5. Greater recognition needs to be provided to school systems and individual teachers conducting outstanding energy education programs.

6. Program planning needs to be done earlier and in closer co-operation with school systems in order that they may have a greater commitment and investment in it.

7. Programming approaches must be more flexible and creative to work with a wide variety of school systems and situations.

8. More student involvement should be encouraged in the planning and conducting of energy education. In many cases students are extremely interested and committed to energy conservation.

9. More effort should be given to combining energy education with the school physical plant energy conservation. The combining of these two programs together seem to make sense.

10. More effort should be given to working with the various ongoing school activities such as debate teams, future homemakers, future farmers, future teachers, and the various vocational groups in designing energy activities which fit into ongoing programs. An example of this might be the development of a high school energy quiz bowl.

11. More financial incentives ought to be offered to school systems and teachers for taking part in energy education programs. This might be done through offering special scholarships and fellowships to teachers who take on energy education responsibility in their school, receive indepth training, and come back and provide in-service training to other teachers.

12. There is a need to develop energy education leadership personnel who can produce the multiplier effect necessary to impact the large number of teachers and students in the state.

13. There is a need to develop an articulated adult-community-student approach to energy education such that all are getting consistent messages.

14. There is a need to collect more data on the use of all of the materials and assess their impact on students.

15. We feel a sense of frustration because there are no data coming to us that can indicate our success or failure as related to the original goals of the project. The only data that we really have in any summary form are the data relating to the workshops themselves and the teachers' perception of them. We do not at this time have any data at all indicating the subsequent use of those materials in the classroom, nor their effect on the students.

h) A Recommendation and Supporting Rationale for Providing Energy Education to High School Aged Clients Including the Contractor's Three Most Preferred Methods.

General

1. Teacher Workshops - It seems that the teacher workshops are an absolute necessity if energy education is to permeate the school age clientelle. First, energy education is not a part of the regular curriculum and will not be included unless teachers are aware of the materials that are available and ways that they can use them within the existing structures of the school curriculum. Second, the prognosis for the future in energy is at best dismal, and we can expect that the energy situation will get increasingly severe. Without an energy

education program to prepare students to adequately cope with decreasing availability of energy, massive social unrest could occur. Thus, it is a national imperative that energy education be included in the school curriculum. This, of course, means that teachers must first be trained.

2. Teacher Consultation Model - With Emphasis on Energy Task Materials.

This model utilizing field staff members making personal contact with high school teachers appears to offer the potential for excellent results. Emphasis should be given to demonstrating to high school teachers the use of task oriented materials in the high school curriculum. Social science, mathematics, science, home economics, and driver education all offer a good for potential utilization of the materials already developed in the "Family Energy Project". This model should be broadened to encourage activities such as those conducted at Special Schools. A monthly newsletter and response postcard should be a part of this model.

The rationale for this recommendation is: In Phase II the teachers in the Teacher Consultation Model taught an average of 4.34 energy class sessions versus 2.2 energy class sessions for control schools which was statistically significant. Approximately 70% of the teachers from both the Teacher Consultant and the Teacher Workshop models actually taught energy conservation. It is known that increased energy conservation teaching is directly related to increasing the student energy conservation ethic and thus conserves energy.

3. Committee School Model

This approach involves a field staff member in a consultantship role to develop energy conservation programming in the

school by the joint planning of students, administrators, and support staff. This approach has two major components. The first is energy conservation in the school by the involvement of those concerned including students, teachers, administrators, custodians, and support personnel. The second and major long term effort is energy conservation at home and in the students' future lives.

The rationale for this recommendation is that this approach gives broad ownership and local determination to the energy conservation effort. The resources from a variety of sources can be utilized as the local situation demands. Although the data are limited to a few schools it provided significant positive changes by students in their conservation ethic only exceeded by the Teacher Workshop Model.

4-H Component

Some smaller proportion of energy education resources should be devoted to testing some innovative approaches such as the following:

(i) Provide media resources such as "Energy and Doubling Time" and "Energy Challenges Youth" to school systems without other models.

(ii) Development of a high school Energy Quiz Bowl program.

(iii) Training of selected community volunteers to be used both in formal and informal education to teach youth energy conservation techniques. Clinics on home weatherization and auto tune ups might be examples of programs that can be offered to older youth and their families.

(iv) Walking or bicycle tours to observe energy conservation practices.

(v) The development of programming and materials to encourage energy conservation displays at science fairs and the establishment of energy fairs.

(vi) Encouragement of the experimental use of classroom teaching gadgets including:

Computer aided Energy Conservation Instruction.

Energy-Environment Simulator - DOE.

Home Energy Conservation Calculator - DOE.

Home and Transportation Conservation Calculator (Prototype of this equipment is being tested by DOE).

Use of Energy Quiz Boards as developed by Michigan 4-H Youth Programs.

Transportation Computer Program as developed by 4-H adapted to programmable calculators.

Miniature home illustrating areas of energy loss and possible ways to reduce energy loss.

Use of infra-red camera equipment to detect heat loss.

(vii) Providing of incentives to students who do demonstrate a significant contribution to energy conservation.

(viii) Use of Nebraska 4-H TV Energy Series.

(ix) Use of Michigan 4-H Energy Project for 9-12 year olds.

(x) Need to compare learning from Energy Comic books, TV programming and classroom teaching.

The rationale for these recommendations is that the approaches recommended are worthy of some share of the resources. Many of these approaches can be implemented with limited dollars and staff time. Media resources and many of the displays and equipment resources are already available free or at low cost. The primary need is to communicate available program resources to teachers and volunteers. Innovative approaches which were used in the pilot project are worthy of evaluation to test their effectiveness.

i) A Summary of Recommendations and Supporting Rationale for Future Research and Evaluative Data Collection in Energy Education Projects.

General

1. We believe that future research should focus on data collection and analysis of all materials used with teachers, such

their subsequent impact can more adequately be ascertained. Further, those materials that seem to have significantly better impact should be carefully analyzed to determine what attributes result in this increase effect. If some common attributes of successful materials can be identified, other materials should be modified and/or developed along these criteria and tested. We believe that it is imperative that the evaluation, development, and training program be integrated such that the evaluation data becomes a formative tool to assist in the development of better materials and better training programs rather than simply a summative evaluation tool to expose weaknesses and strengths which cannot be addressed before the end of the project.

2. Less proportion of educational time should be devoted to evaluation. The proportion of time especially in Region III appeared to interfere with the task of carrying out energy education programs.
3. More emphasis should be made on evaluating the actual amount of energy saving.
4. More evaluation of energy programs with elementary and middle school age students is needed.
5. More comparison between teaching strategies is needed.
6. Further study needs to be done regarding the approaches which have the most success in reducing the energy consumption among teenagers in the area of transportation.

j) A Review of Fiscal Limitations Which Impacted Project Success and Recommendations for Restructuring Energy Education Budgeting.

4-H Component

1. The budget constraints of the project made it impossible to hire a regional coordinator for Region I which was the most populated region in the pilot project. Certainly much more could have been done if a coordinator would have been hired and assigned to this region. Secondly, only 60% funding was initially available for Regions IV and V in the project. When only part time positions are available it is often very difficult to get the quality of staff that you would like to obtain for these positions. Serious funding limitations in the extension of the project April 1, 1979 through August 31, 1979 forced the termination of two quarter time secretarial positions as of April 1. The program leader's portion of time was cut from 90% to 80% and the program leader's secretary was cut from 100% to 80%. These funding restrictions also called for the termination of coordinators in Region IV and V as of June 1, 1979.
2. The limitation of funds made it impossible to offer financial incentives to the schools and teachers to take part in workshops and other programs. Perhaps other avenues of financing and cost sharing should have been explored.

SMTC Component

1. Although the fiscal limitations were considerable, the budget was not impossible to adhere to.
2. The project has paid for the development of innovative and high impact materials that, without some change in funding,

will not be distributed to teachers. The total effectiveness of the project is severely hampered by the turn of the project toward the development of large quantities of instructional materials in energy education without an accompany budget for printing and distributing these materials on a wide scale.

k) A Recommendation Covering the Nature, Content, and Structure of Energy Education Policies for the Total State and Country as a Whole.

General

1. There should be more opportunity for locally determined energy education programs with the emphasis being given to school districts so that they would have a greater responsibility towards and ownership of energy education programming.
2. Greater use should be made of trained volunteers in both formal and informal education. A limited number of volunteers can be given training with the hope that they will put their knowledge to work in training others. There are numerous successful models for this in both formal and informal education.
3. Considerable more effort should be placed on teacher education in energy education in order to help make energy education a part of school curriculum K through 12.
4. Energy education needs to be integrated into existing education at all levels K-3, 4-6, 7-8, 9-12, and adults in both formal and informal education.
5. Generally it appears to be better to integrate energy education into existing programs and classes rather than creating new programs.
6. Emphasis should be given to capturing the creativity of youth K-12.

7. Energy conservation conducted through the schools or youth programs must put heavy emphasis on the involvement of parents in the program if the program is to achieve the objectives of reducing the families' energy consumption.

8. In energy conservation education emphasis should be placed on conservation in home heating, transportation, and the net energy concept.

9. The evaluation form should examine some of the other concepts that were taught to ascertain whether they are being comprehended by students. In particular, the "Energy and Doubling Time" filmstrip or booklet teaches two concepts that have not been examined at all on the Youth Energy Survey. Some of the other materials also teach concepts that have not been examined in the evaluation.

APPENDIX A

Workshop Agendas

WORKSHOP AGENDA

1. The dates and locations of the first workshop model were as follows:

Ingham	February 27, March 13, and April 19, 1978.
Jackson	February 22, March 6, and April 18, 1978.
Calhoun	March 1, 20, and April 17, 1978.

Workshop Plan

Day 1

a. The first day included an explanation to the teachers of the project, why they were there, and raising the question, "Does education really make. teachers' expectations of the workshop; we wanted to know what disciplines they teach and the number of students with whom they expect to use these materials and how much class time they will allow.

b. We presented three scenarios: business as usual, increased use of fossil fuels, and conservation as a mechanism for buying time until new technologies can be developed.

c. The teacher's value system toward energy conservation was assessed using the energy questionnaire (Appendix 1).

d. Three scenarios were role played by designing role cards which were presented by a panel to the rest of the group. We used a variety of hypothetical (what if) cards to raise serious questions about each position. A prime purpose of the scenarios was to focus on the need to 1) produce some hope that things are not futile, and 2) to recognize that whatever scenario is adopted, conservation is a must.

We presented data on 1) where the most energy is used, 2) what kind of conservation measures were acceptable, and a recognition that any conservation measure will change lifestyles, 3) facts were presented on how much each conservation measure contributes, 4) we discussed what can be taught in the classroom including concepts such as what is a degree day, 5) we introduced the energy audit, both home and transportation conservation with the purpose of getting some baseline data, and 6) did brainstorming to determine the information perceived as needed in order to contribute to the total project.

Day 2

a. The introductory session on "How It Went" included what each teacher had done with success and with failures.

b. Results were shared concerning how many kids did they really reach, how much time did they spend.

c. A large portion of Day 2 was devoted to student activities and materials.

d. Additional technical information based on previous requests was presented.

e. We determined what questions still remained and what needed to be done on the final workshop day.

f. How does Energy Education fit into existing curricula? e.g., What does an English teacher do with Energy Education?

Day 3

a. We relooked at the energy ethic.

b. We reassessed teacher values.

c. We determined what were the next steps for the teacher, what materials they need, what inservice, what curriculum development, etc.

d. Another look was taken at what has been done, with what effect.

e. A list of contacts--at the local, state, and federal levels-were presented.

f. We assessed the impact on the school as perceived both up to this point and in the future. Some future planning was developed.

g. The workshop assessment instrument was completed.

2. The locations and dates of the second workshop model were as follows:

Higgins Lake	August 11-13, 1978.
Waldon Woods	August 21-23, 1978.

Workshop Plan

The Summer workshops were designed to allow for more interaction between participants and workshop presenters. Furthermore, these Summer workshops made use of the information from the three Spring workshops. In order to improve the dissemination of materials a Teacher's Guide (see Appendix 2) was prepared and used in these (and all subsequent) workshops. The schedule of events was as follows:

Friday Night

Introduction and Overview of workshops.

Group Activities.

Energy Films.

Assignment for Next Day.

Saturday

Feedback.

Doubling Time Filmstrip.

Project Explanation.

Break.

Meter Activities.

Lunch.

Values and Attitudes on Energy.

Household Energy Game.

Break.

Energy Scenario-Politics of Energy.

Distribution of Energy Materials.

Evaluation.

Dinner.

Group Activities.

Films and other Options.

Sunday

Reports from Problem Groups.

Feedback.

New Materials.

Break.

Group by Schools and Future.

Sunday (Continued)

Plans.

Share.

Evaluation.

Certain modifications were introduced in the second weekend workshop at Waldon Woods and these are described as follows:

Friday Night

(i) Introductory Activities

a) Time for 2 min.--each person.

b) Give suggestions: What do you do?
Likes-dislikes.
Greatest event, proudest of what?
etc...

(ii) Problem Groups

a) EMPHASIZE "problems you will face, as teachers, in your schools:.

b) "Workshop format is flexible...we will modify it according to your votes".

c) Use BALLOTS--get top 3 problems.

d) TALLY DURING MIXER, REPORT TO GROUP AFTER MIXER.

(iii) Energy Mixer

a) Find partner (energy source--energy need)

b) Energy source areas (energy sources take partners to area.

(Are energy source cards in correct proportion?)

c) Have large group sort into three smaller groups:

LIGHTING
OTHER APPLIANCES (Non-lighting)
TRANSPORTATION

participants try to rank order, within each group, according to "most efficient...least efficient" (Questions will come up--record questions on newsprint up front).

Saturday Afternoon

(iv) Scenarios Game

a. Groups: Edison Electric Institute
Federal Government
OPEC
Ford Motor Co.
American Agricultural Movement (Lobbying Group)
Sears
Assoc. of Michigan Food Co-ops.
AFL-CIO

b. Role statements (goals), things to keep in mind while playing game.

Edison Electric: 1) Concerned with meeting future demand.
2) Sufficient profit to keep stockholders happy.

Federal Government: 1) Cut oil imports.
2) Major current controversy: Keep energy cheap v. insure sufficient supply.

OPEC: 1) Sufficient profit to develop countries, but
2) Regulate money flow so that customers aren't wiped out, i.e., prevent world-wide recession.

Ford Motor Co. 1) Making cars people will buy (More Efficient? New fuels? New products?)
2) Cut energy costs.

American Agricultural Movement: 1) Keep price of food high.
2) Produce sufficient supply, but control surplus.
3) Cut energy costs (Decentralize? Biomass?)

:ears: 1) Cut energy costs.

2) Innovations...(communication, marketing, etc.) to improve competitive position.

Assoc. of Michigan Food Co-ops: 1) Maintain ecological systems so that life can survive on the planet.

2) Get information to public, and organize groups, for: Decentralizing food distribution, reduction of huge "middleman" profit, creation of self-sufficient energy farms, etc.

AFL-CIO: 1) Keep members working decrease unemployment.

2) Push for more "labor-intensive", rather than "energy intensive" industry.

(iv) Scenarios (continued)

(POST ON NEWSPRINT)

Current parameters:

Oil imports: about 3.2 billion barrel in 1977, 47% total used.

Total energy demand increased 4.8%, 1967-1977.

U.S. population growth:

Inflation rate:

Supply picture for oil, coal, and gas: (Bartlett's and Fowler's estimates for no. of years left at different demand rates).

(TABLE)

Current unemployment rate:

NO NATIONAL ENERGY POLICY.

PROCEDURES:

Print roles for each group on their newsprint up front.

When group makes decision, group member writes decision on their newsprint, tapes to wall.

Each group must make a new decision every three minutes. TIMED AND ENFORCED.

Saturday Evening

(v) Problems, second session.

a) Problem nature of energy education (Marty).

b) Problem vs. Discipline (Dick).

c) Get group to categorize problems and prioritize the categories (Dave).

Sunday Morning

(vi) Regional Planning: one staff member stays with one regional group for about 20 minutes - half hour. Then, leave group, "circulate", but keep eye on group, check to see if they are still dealing with the task.

3. The dates and locations of the third workshop model were as follows:

October 24	Albion, Michigan - Holiday Inn
October 24	East Lansing - University Club
November 8	Coopersville, Michigan - Charver's Restaurant
November 9	Grand Rapids, Michigan - Holiday Inn
October 10-12	Traverse City and Grayling - Shield's Restaurant and Holiday Inn.
October 16-19	Marquette and Hancock, Michigan - Northwoods Supper Club and Colonial Steakhouse
November 15	Pontiac, Michigan - Sheraton Inn
November 16	Garden City, Michigan - Leather Bottle

WORKSHOP SCHEDULE

Energy Education K-8

April 26, 1979

I. Introduction

II. Questionnaire

II. Doubling Time Filmstrip and Questions

IV. Household Energy Game

V. Energy Dilemmas

VI. Samantha and Sabastian Take a Trip to the Beach

VII. Dinner

VIII. Energy Bicycle and the Energy of Coal

IX. Divide into two groups:

K-4

1. A gift from the Sun, K-3.
2. Award Winning Energy Activities, K-8.
3. Wind
4. The Energy We Use, Grade 1.
5. Community Workers and the Energy They Use, Grade 2.
6. Energy and Transportation, Grade 3.
7. Take Home Activities for these Materials.
8. "Energy Conservation in the Home," prepared by University of Tennessee Environment Center, available from D.O.E.
9. "Charts and Graphs--Assembled by the Science and Mathematics Teaching Center, Michigan State University.

5-8

1. Award Winning Energy Activities, K-8.
2. Wind.
3. Networks, Grades 4 & 5.
4. Bringing Energy to the People, Grades 6 and 7.
5. Transportation in the City, Grade 8 through 9.
6. Take Home Activities for those Materials.
7. "Energy Conservation in the Home," prepared by University of Tennessee Environment Center, available from D.O.E.
8. "Charts and Graphs--Assembled by the Science and Mathematics Teaching Center, Michigan State University.

X. Evaluation

AGENDA FOR HIGGINS LAKE WORKSHOP

July 27 - 29, 1979

Friday

4:00 -	?	Registration
		Test will be handed out at registration and must be handed in to go to dinner.
6:00 -	6:45	Dinner
6:45 -	7:00	Introductions and General Overview of Workshop
7:00 -	7:30	Energy Occupations Game (Mixer)
		Group Work on energy use decisions (which occupations are high/low energy users?)
7:30 -	8:15	Doubling Time
8:15 -	9:00	Household Energy Game
		Energy Matrix
		Assignment: How Could Household Energy Game and/or Doubling Time be adapted to the elementary/middle school classroom? Read Asimov article.
9:00 -	?	Films

Saturday

7:30 -	8:30	Breakfast
8:30 -	8:45	Feedback from Energy Test (taken Friday)
8:45 -	9:00	Overview of EES and Youth Project
9:00 -	9:30	Dilemmas and Options
9:30 -	9:45	Listening Skills Story } relate to Language Arts
9:45 -	10:00	Energy Crunch } relate to Language Arts

AGENDA FOR A BTU (Better Than Coal)
ENERGY WORKSHOP

4:00 - 4:18	Introduction to the project, High Quality Staff, and Marty.
4:18 - 4:30	A Trip to the Beach with Sebastian and Samantha.
4:30 - 5:15	Large Quantities of Invaluable and worthless background information.
5:15 - 6:00	How much energy do you use -- Are you really a Joule).
6:00 - 6:45	Gourmet Italian Buffet with atmosphere.
6:45 - 7:00	How to Kilo calorie or watt's the difference, an electrifying experience.
7:00 - 9:00	Curriculum materials you can use (both good and not so good).

*All times are ± 625 minutes.

MH:tf
042679

Saturday (Continued)

10:00 - 10:15	Break
10:15	Alien judge announces winner of "energy crunch" contest
10:15 - 10:30	Energy Bike and Coal
10:30 - 11:30	Build Energy Houses
11:30 - 11:45	Trip to Beach (if time)
12:00 - 1:00	Lunch
1:00 - 2:30	Values and Lifestyle
	Values Activity (paper folding)
	Lifestyle discussion
	Outdoor Activity
	Debriefing
	Trip to Beach (if not used before)
2:30 - 2:45	Break
2:45 - 3:30	Curriculum Materials - presentation
	NSTA Materials
	Take-home Activities
3:30 - 3:45	Workshop Evaluation
3:35 - 5:30	Free Time
5:30 - 7:00	Dinner
7:00 - 7:15	Evaluation Feedback
7:15 - 7:45	Curriculum Infusion

(Small group discussions--where can energy education be infused; how can materials best be adapted?; what needs have to be met before infusion can be successful?)

Saturday (Continued)

7:45 - [illegible]	[illegible] Materials
	[illegible]
	Send [illegible]'s menu adaptation for 5th grade
[illegible] - [illegible]	[illegible]
[illegible] -	Showtime!!

Sunday

7:[illegible] - [illegible]	[illegible]
[illegible] - [illegible]	[illegible] developed materials (4 Seasons posters, [illegible] Game, and others)
9:30 - 10:[illegible]	[illegible] Research Activity and charts and graphs
10:00 - 10:15	Break
10:15 - 10:45	Strategies for Implementation (small group discussions)
10:45 - 11:15	Sharing of Group Decisions (compile worthwhile suggestions to send out to participants later)
11:15 - 11:45	Evaluation and Group Good-byes
12:00	Lunch and Home

ENERGY WORKSHOP FOR ELEMENTARY AND
MIDDLE SCHOOL TEACHERS

4:00	Registration
4:15	(VEES) Introduction and Energy Questionnaire
4:30	Doubling Time
5:15	Take Home Activities
5:45	Trip to the Beach
6:00	Dinner
6:30	Energy Dilemmas and Options
6:45	Oil Search
7:00	BTU Materials- Story
7:45	Oak Ridge Materials
8:00	Energy a Gift from the Sun
8:15	NSTA Materials
8:45	Teachers Guide
9:00	Evaluation and Adjournment

APPENDIX B

Sample Newsletters

DEAR ENERGY PARADOCS

Dear Energy Paradocs:

You keep telling people that the filmstrip about energy and doubling (the one with the snart and the ortep) will be available soon. Do you think it will be ready by Christmas or has this just been double talk?

Signed

All Ears

Dear Ears:

No double talk from us. No double talk from us. The filmstrip, "Energy and Doubling Time" is available on either a loan or purchase basis even as you read these very words. If you want it on a loan basis, contact your 4-H Energy Coordinator or any of the secretaries in our office (517-355-1725). If you wish to purchase a filmstrip and cassette, they are available now at a nominal cost of $9.50 + postage for the set. This price is subject to change at a later date as we know better exactly what it costs to handle it. If you wish to purchase, please call our office (517-355-1725).

Signed

Your Energy Paradocs,
Marty and Dick

Dear Energy Paradocs:

Since introducing energy conservation materials in my classroom, I have found my students much more interested and, in addition, I have been getting much better check-ups at the dentist. Do you have any additional pearls of wisdom that might help me to become an even more complete and loving person?

Signed

Getting it all Together

Dear CAT:

You are wise in coming to us for the kind of help you need. While we can certainly provide everything you need to become a BTU (better than usual) person, the limited space only permits one item at a time. The BTU item this issue is: if you really want to become a Joule look at the President's new energy bill.

You will become the hit of the party when you tell all your friends that the tax on their gas guzzler will cost them over $200 in 1989 and several thousand by 2000.

You can further dazzle them with your knowledge about the new natural gas costs when price controls are lifted. Don't be boreing. Study all five volumes of the new energy bill and thrill even your best informed friends.

Your Energy Paradocs,

Marty and Dick

Dear Energy Paradocs:

We have a lot of wood in our area. Why can't the entire United States shift to wood instead of oil, coal, etc.

Signed,

Wood for Energy and Economic Progress

Dear WEEP:

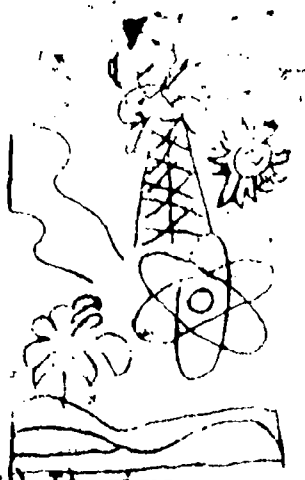
What a fine idea! Actually, we could do that. Unfortunately, it would take all of our biomass production to furnish our energy needs. This might make for a rather hungry populace. I refer you to Fact Sheets, Number 1 and 2 for further information--free from your energy hot line 1--800--292-4704. Biomass conversion as <u>one</u> alternative, however, rather than the alternative is certainly <u>one</u> that we must continue to develop.

Signed,

Your Energy Paradocs
Marty and Dick

Keep your cards and letters coming. They should be addressed to the Energy Paradoes, E-37 McDonel Hall, Michigan State University, East Lansing, Michigan 48824. All letters become the property of the Energy Paradoes. We will select those that have most interest and/or general appeal for response in the column. Others will receive either a personal telephone call or response by mail.

THE ENERGY INFORMER



December, 1978

ENERGY PARADOCS

Dear Energy Paradocs,

I have used all of the materials that you gave me at the workshop and am panting for more. I are teaching high school English most of the time but are also enliting my students in social science. What can I do?

Signed, Panting

Dear Panting,

You must be the hit of your scho... I am sure that your English students appreciate the flexibility you displa... in grammar and spelling. A ne... packet has just come out from the National Science Teacher's Associa... entitled, "Critical Thinking." It is aimed at the high school English, speech, and social studies classes and seems to be just the ticket for your kind of class. It is available FREE from the National Science Teacher's Association, 1742 Connecticut Ave., N.W., Washington, D.C. 20009

* * *

FREE ENERGY T-SHIRT

Do you have students who are speaking out about energy? Special, FREE "I am Saving Energy" T-shirts may be awarded to teens who make two or more presentations to other students on energy conservation. If your students qualify, please call Sara Paton at 724-6362. If your students haven't been spreading the energy message, perhaps this could get them started.

* * *

STUDENT REPORTING CARD

Included with this newsletter is a student reporting card. This card serves two purposes. 1) It gives you an easy way to contact me if you need energy materials or other resource assistance, such as films and 2) the number of students reached by your energy programming need to be collected for state reports that are submitted to the U.S. Department of Energy. The teachers in Region 3 are doing some important work in energy conservation education and this should be documented. These cards and this newsletter will be sent once a month, and I sincerely appreciate your participation. Also, to gather data on the attitudes of your students concerning energy conservation, the Energy Extension Service would like to run a one-page survey in your classroom at some time during the first two weeks in January. This will help in providing concrete documentation of the students' energy conservation ethic.

* * *

ENERGY MATERIALS AVAILABLE

Contact: Sara Paton, Cooperative Extension Service, 635 Ottawa St., Muskegon, MI 49440/724-6362 (unless otherwise shown) or use the enclosed reporting card to order.

1. "MORE" Time: 2½ minutes
   Charge: None
   A fascinating animated picture of what an all consuming greedy use of resources could do to mankind and his world, or call it a short, intriguing commercial for ecology.

2. "ENERGY AND DOUBLING TIME"
   Time: 15 minutes
   Charge: Non on loan
   To Purchase: $9.50 + 68¢ postage (Total $10.18) Students booklets-FREE (Continued on back)

This is a filmstrip and tape that was developed by Dr. Richard McLeod of the Math and Science Teaching Center at MSU. The film discusses the doubling-time concept and uses the life cycle of the mythological Red Banded Snarf to demonstrate this concept. The Snarf and his use of "ortep" runs parallel to our energy use past and present. There are student booklets that go along with the film. These are available in quantity. The use of these together is a very effective way to dramatize the seriousness of the energy-resource situation and will stimulate discussion about the reality of the energy crisis and the need for conservation.

3. "ENERGY CHALLANGES YOUTH"
Time: 12 minutes
Charge: None

Focusing on youth, this slide-tape describes our country's energy problem. The show emphasizes the immediate need for conservation in a world increasingly dependent on limited fossil fuels and describes some easily implemented conservation behaviors. Interviews with youth are featured.

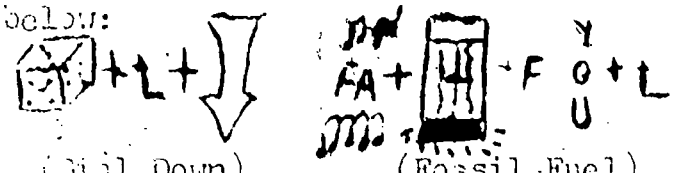
4. HOME AND TRANSPORTATION AUDITS
Charge: None
These are two surveys you can use in your classroom. Students would receive the audits in the classroom; take them home and fill them out with their parents and then return them to school. I would pick them up; send them to MSU to be run through a computer. A cost analysis would be mailed back directly to the students' home showing them how their money is being spent and with suggestions on where they can save more money by putting into practice conservation techniques.

5. "A THOUSAND SUNS" - Department of Natural Resources, Box 30028, Lansing, MI 48909/(517) 373-2199
Time: 9 minutes
Charge: $4

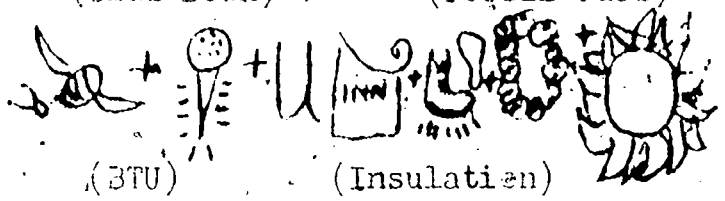
Contends that we face an energy and an ethics crisis. Gripping, yet quiet and sensitive film statement putting the ethics of human consumption into human perspectime. An excellent film.

* * *

The Energy Alphabet is a way to define energy terms using word pictures. There is an energy term for each letter of the alphabet and students enjoy guessing the word pictures that will explain the energy term. But watch it; it gets tricky when you get to X, Y, Z. Some examples to get you started are shown below:

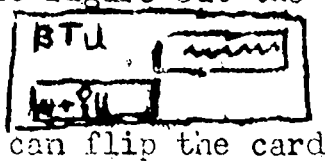


(Oil Down) (Fossil Fuel)



(BTU) (Insulation)

These pictures can be placed on cards and affixed to a piece of tag board using a strip of tape as a hinge. Then the definition can be written on the other side. In this way, people have to work through the picture to figure out the energy term



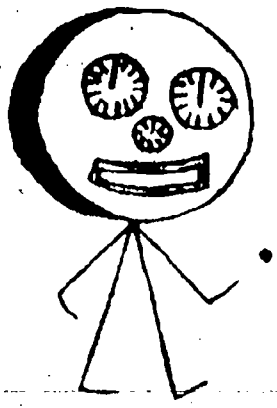
Then you can flip the card over and read the definition. The words can be adapted to any subject area.

* * *

The Youth Energy Project is funded by the Michigan Department of Energy and the Michigan Energy Extension Service on a pilot basis. Michigan State University's Cooperative Extension Service (4-H programs) and Science and Mathematics Teaching Center are the Project's contractors. This newsletter was prepared with the support of the U.S. Department of Energy (DOE) Grant No. EC-77-6-01-5092. However, any opinions, findings, conclusions or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of DOE.

THE METER READER

ENERGY NEWSLETTER



January, 1979

FIRST THINGS FIRST

Thank you, teachers, and principals, for your cooperation in getting the student surveys done. This information is vital for evaluation.

* * * * *

The reporting cards that you have received are for the month of January. If you talked about the energy situation with your students for 15 minutes, please record it and send in your card. If you haven't done any work in energy conservation so far, please send your card in.

Last month an Ingham County teacher worked with 135 students but didn't name the school or sign the card. Would the teacher from Ingham County who wants information on A V material send this month's card in with signature added?

These cards are important for verifying the number of students receiving information on energy conservation. Thank you for your help.

* * * * *

DEAR ENERGY PARADOCS

Dear Energy Paradocs,

I am really trying to do a job on this energy stuff and have told my students that reducing their home temperature in winter would really save energy and $'s. But, how much will it really save? Where can I get this information?

Signed,

Teacher Energy and Related Savings

Dear TEARS,

You are indeed, a BTU (better than usual) teacher. Thermostat set backs save $'s! According to the National Science Teacher's Association fact sheet #9, "Lowering daytime temperatures from 74°F. to 68°F. and nighttime from 66°F. to 60°F. will reduce winter time heating needs by 15%, saving 15 out of every 100 heating $'s." This fact sheet is available free by calling your Michigan Energy Hotline 1-800-272-4704.

Your Energy Paradocs,

Dick and Marty

Should you wish to contact the Energy Paradocs, write to:

Dr. Marty Petherington or
Dr. Dick McLeod
Science & Math. Teaching Center
E. 37 McDonal Hall, M.S.U.
East Lansing, MI 48824

* * * * *

LANSING SEXTON'S PHYSICS PROGRAM FOR ENERGY CONSERVATION

In learning about energy conservation, the Man Made World science classes at Sexton are using the booklet Energy and Doubling Time as well as their text books. The Red-Banded Snark makes learning fun by introducing the basic concepts and relating them to every day life.

Mr. Reid and Mr. Deslich, the Physics teachers at our high school have also spent some time on the topic of Energy Usage and Conservation in the Physics and Advanced Physics classes. Many students have found that Energy Conservation is contagious; it passes down from instructor to student, to parent, to friends, etc., etc.

Bob Richardson
11th Grade
Sexton H.S.
Lansing, Michigan

* * * * *

THE BIG ENERGY CONSUMERS

Do you know what accounts for 82% of the energy consumed by family units? It is the private auto and home heating. Note the percentages below:

Private Auto	42%
Heating and Air Conditioning	40%
Hot Water	6%
Cooking	4%
Refrigeration	4%
Miscellaneous	3%
Lighting	1%

Let's emphasize dialing down and driving less.

By Lowell Rothert

* * * * *

A GOLDEN OPPORTUNITY

The youth within the circulation area of The State Journal have an opportunity to win a $500 bond. The State Journal is again sponsoring a Youth Talent Exhibit. The contest will have energy-related categories (Creative Writing, Design Problems, Biological Science and Physical Science.)

Dates for the exhibit are: March 25 - March 31, 1979. Entry blank deadline is February 24, 1979. Entry blanks are available at The State Journal for students in grades 5 - 12.

* * * * *

AUDIO - VISUALS

Two very good films for teaching energy conservation in regards to transportation:

1.) Featherfoot
2.) Running on Empty

Available from:

Eleanor Edwards
6520 Mercantile Way
Suite #1
Lansing, MI 48910

For information assistance or suggestions contact:

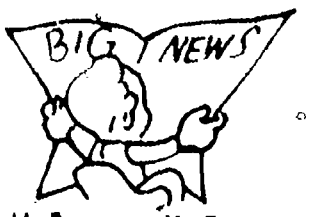
Marge Spawr
412 Erie St.
Jackson, MI 49202
788-4292

* * * * *

The Youth Energy Project is funded by the Michigan Department of Energy and the Michigan Energy Extension Service on a pilot basis.

Michigan State University Cooperative Extension Service and the Science and Mathematics Teaching Center are the Project's contractors.

ENERGY GOBBLER



APRIL 1979

Welcome K-8 teachers. I hope you will find this newsletter helpful in locating resources for your classroom work. In order for me to serve you better, please return the student reporting card every month regardless of whether you've covered an energy unit or not; these cards are the most important component of the Youth Energy Project. Any suggestions for improving this newsletter and any articles or ideas you would like to submit would be sincerely appreciated. That goes for all you Youth Energy Project Vets too! Thanks so much; You've all been great.

Libby Morley
4-H Energy Agent
CES Kalkaska

AUDIO VISUAL

Most of the materials listed below are available through the Kalkaska Cooperative Extension Service Office. You can order these quickly either by using your student reporting cards or calling (616) 258-4252.

1. The Transportation Survey - computer printout.
2. Energy and Doubling Time:
   a. filmstrip and cassette - 22 min.
   b. student booklets (60/teacher)
3. Family Energy Projects
   a. spiral bound teacher guide
   b. student booklets-On the Road/ In the Home
4. More 16mm film -2½ min.
5. Energy Challenges Youth - slide/ tape- 8 min.
6. U.S. Energy Policy-Which Direction Grades 11-12. Reducing dependence on foreign oil, the possibilities of coal, building an energy policy.
7. How a Bill Becomes a Law to Conserve Energy - Grades 9-12. This is a case study of a bill which describes how the 55-mph national speed limit came to be.
8. I'm Saving Energy - T-shirt. If any of your students have made two energy presentations, each to groups of ten people or more, they can receive this colorful T-shirt. (Sizes M-XLg). For more information call 258-4252.
9. Don't forget all the goodies available free through the hotline no. 1-800-292-4704.
10. Featherfoot - 16mm-30 min. This film has a built-in-quizz covering ten major driving practices. The narrator uses vivid demonstrations to illustrate driving techniques and asks the viewer to answer a pertinent question relating to the example. The quiz is self-correcting, in that the answer is given before moving on to the next question. Great for Driver Ed.
11. A Thousand Suns - Dept. of Natural Resources, Box 30028, Lansing, Michigan 48909. (517) 373-2199. 16mm - 9 min. This film contends that we face an energy as well as ethics, crisis. Gripping, yet quiet and sensitive film statement putting the ethics of human consumption into perspectives.

EXTRA!! EXTRA!!

An excellent newsletter to get your hands on, if you don't already receive it, is the Energy & Education newsletter, published bi-monthly by the NSTA Association. It contains a guest editorial, book reviews, featured articles, a calendar of events dealing with energy education and a "free or inexpensive energy materials" section. You can be on that mailing list by writing to:

National Science Teachers Assn.
1742 Connecticut Ave., N.W.
Washington, D.C. 20009

AND...

Two resource books that are full of ideas....

1. Energy Primer - Solar wind, water, and Bio-fuels. (Updated and revised edition). Edited by Richard Merrill & Thomas Gage.
2. 10 Faces of the Universe - Fredric Hoyle - Excellent for Physics & Chemistry Teachers

Both are paper backs-

One more...

Everyman's Guide to Ecological Living, by Grey Cailliet, Paul Setzer, Milton Love.
Provides advise and suggestions about activities that concerned people can undertake to relieve the impending environmental energy crisis.

TEACHER SPOTLIGHT

Teachers & students from Kingsley, Buckley, Traverse City and Central Lake are going to participate in the Interlochen Energy Symposium on May 3, 1979 from 9:00 A.M. to 3:00 P.M. This program proves to be very enlightening on the topics of alternative energies. Speakers from MSU and the local area will be there to share their expertise.

Mark Nelson, Kalkaska Middle School teacher, had his students building solar collectors and trying them out in the sun. Even with the outside temperature below 40°, temperatures in some of the collectors made it up to 192 degrees.

Driving Less but Paying More?

As you well know gasoline and diesel fuel prices are increasing rapidly. So what can you do? How about following the recommendations of the Transportation Survey Computer Program?

The following table based upon 906 Michigan families in April and May of 1978 gives you the potential savings.

ANNUAL POTENTIAL $ SAVINGS IN MOTOR FUEL COST ONLY BASED ON AVERAGE OF 906 FAMILIES RESPONDING

Recommended Conservation Practice	April 1978 at .62¢ per gal.	April 1979 at .78¢ per gal.	April 1980 Est. $1.00
Carpool or public transportation to reduce driving to work by 50%	164.21	206.59	264.85
Limit Grocery Shopping to 1 trip per week	36.62	46.07	59.06
Out of town driving Reduce by 10%	9.87	12.42	15.92
Ardund town Driving Reduce by 20%	41.53	52.25	66.98
Vacation Driving Reduce by 10%	12.53	15.76	20.21
Children use school bus rather than family transportation.	47.92	60.29	93.50
Total $$ Savings per family	$312.68	$393.38	$520.52

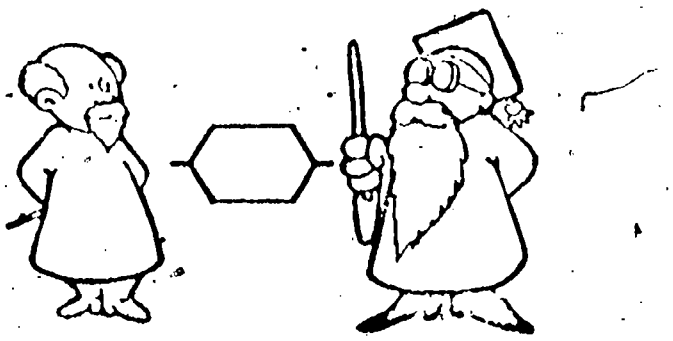
The Energy Gobbler comes to you from the office of Libby Morley, 4-H Youth Agent, Kalkaska Cooperative Extension Service, Youth Energy Project, 605 N. Birch St., Kalkaska, MI 49646

The Youth Energy Project is funded by the Michigan Department of Commerce and the Michigan Energy Extension Service on a pilot basis. Michigan State University's Cooperative Extension Service (4-H — Youth Programs) and Science and Mathematics Teaching Center are the project contractors. This material was prepared with the support of the U.S. Department of Energy (DOE) Grant No. EC-77-6-01-5092. However, any opinions, findings, conclusions or recommendations expressed herein are those of the author(s) and do not necessarily reflect the view of DOE.

NEWS FROM THE ENERGY PARADOCS

January 11, 1979
Vol. 1 No. 1

It has been nearly three months since our work together at Higgins Lake and Walden Woods (remember the good food!). It seems as though so much has happened since then. We have condensed the material that was presented in the full two days to a four-hour workshop and conducted ten of these around the state -- including two in the upper peninsula. We have also presented the material at several schools and conferences. Actually, we are now almost out of energy.

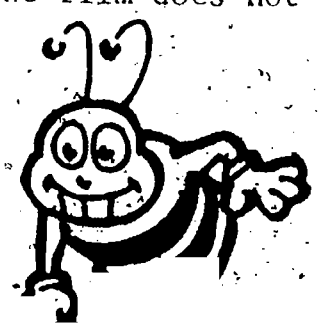


After the summer workshops, we used your feedback to revise the filmstrip on doubling time. We think it is considerably improved and is now available on a free loan basis or may be purchased for $10.18 including postage. Just call or write our office if you want it either way.

During November, we had two follow-up conferences for those of you in Region I. If you missed either of them you missed a good meal and the chance to see your friends dressed in something other than their "grubbies." Half of us didn't even recognize each other because we were so clean and neat.

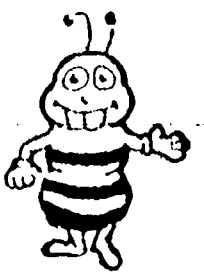
We want to remind you that we are anxious to help in any way that we can to get energy education moving in your classes or your schools.

If you can think of ways that we can help, just let us know. For example, at the Pontiac follow-up the question was raised on how we can use infra red film to identify home heat loss areas. As a result, we contacted the Kodak research labs and found that it just won't work. The film does not respond to temperatures less than 250 degrees centigrade. At this temperature, the entire house would be a heat loss and you wouldn't need a camera to see it. Based on this information, we can only conclude that those people who told us it works must have been reading more into the pictures than they should have.



Another way that we can help is by responding to your letters and phone calls. We have decided to do this via the "Dear Energy Paradocs" column. The following are examples of the fine letters that we have received.

DEAR ENERGY PARADOCS



Dear Energy Paradocs:

You keep telling people that the filmstrip about energy and doubling time (the one with the Snarf and the Ortep) will be available soon. Do you think it will be ready by Christmas, or has this just been double talk?

Signed
All Ears

Dear Ears:

No No double double talk talk from from us us! The filmstrip, "Energy and Doubling Time" is available on either a loan or purchase basis even as you read these very words. If you want it on a loan basis, contact any of the secretaries in our office at 517/355-1725. If you wish to purchase a filmstrip [redacted] cassette, they are available now at a nominal cost of $9.50 plus postage for the set. This price is subject to change at a later date as we know better exactly what it costs to handle it. If you wish to purchase, please call our office.

Signed,
Your Energy Paradocs
Marty and Dick

Dear Energy Paradocs:

Since introducing energy conservation materials in my classroom, I have found my students much more interested and, in addition, I have been getting much better check-ups at the dentist. Do you have any additional pearls of wisdom that might help me to become an even more complete and loving person?

Signed,
Getting it all Together

Dear GAT:

You are wise in coming to us for the kind of help you need. While we can certainly provide everything you need to become a BTU (Better than Usual) person, the limited space only permits one item at a time. The BTU item this issue is:

If you really want to become a Joul, look at the President's new energy bill. You will become the hit of the party when you tell all your friends that a percentage tax on their gas guzzler will cost them over $200 in 1980 and several thousand by year 2000.

You can further dazzle them with your knowledge about the new natural gas prices when price controls are lifted. Don't be boring. Study all five volumes of the new energy bill and thrill even your best informed friends.

Signed,
Your Energy Paradocs
Marty and Dick

Dear Energy Paradocs:

We have a lot of wood in our area. Why can't the entire United States shift to wood instead of oil, coal, etc.?

Signed,
Wood for Energy and Economic Progress

Dear WEEP:

What a fine idea! Actually, we could do that. Unfortunately, it would take all of our biomass production to furnish our energy needs. This might make for a rather hungry populace. I refer you to NSTA Fact Sheets No. 1 and 2 for further information--free from your energy hot line 1-800-292-4704.

Biomass conversion as one alternative, however, rather than the alternative is certainly one that we must continue to develop.

Signed,
Your Energy Paradocs
Marty and Dick

NEW INFORMATION YOU CAN USE

1. Teacher Packets: The New Westward Movement Grade 11 investigates energy resources in the West and studies the effect of possible large scale resource development on the economy, environment, and social structure of the Western United States. Available free from: National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009.

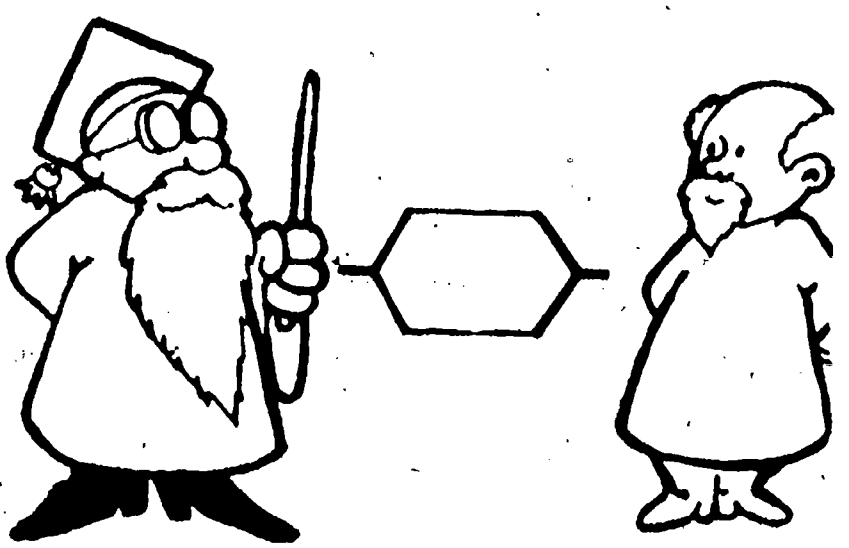
2. A Variety of Fact Sheets on everything from bioconversion, wind power, and breeder reactors to geothermal energy. Available from the Michigan Clearinghouse, Energy Extension Services hot line telephone 1-800-292-4704 (no charge to calling party).

3. Energy and Education - a bi-monthly newsletter published by the National Science Teachers Association. Available free by writing NSTA, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009 and requesting same.

4. The Michigan Department of Commerce Register. Available free by writing the Michigan Department of Commerce Office of Public Affairs, P.O. Box 30004, Lansing, Michigan 48909.

CONCLUDING NOTES

If you got through all of the above, thanks for reading this little gem. Now help us make the next issue just as responsive as we can possibly make it by sharing with us some of the things that you are doing at work, some questions you have, and some ideas that you have that others might like to try. We will try to use this Newsletter as a vehicle to help share all these little tidbits. Let us know what is going on and keep writing.



PLADITS

Congratulations to Diane Baudoux and Carol Coin for the really fine job at the annual luncheon for the Warren Beautification Committee. We really appreciate the inclusion of energy in the project.

Congratulations to Tim and Mary Kiddlewitz on the sale of their 28ft. motor home. Camping is really more fun in a chevette anyway Tim.

Congratulations to Marty Hetherington on not fixing his gas-guzzling Ford Torino. Much better to share a ride with a friend Marty, or walk (especially since your insurance was cancelled by the C.U.).

Congratulations to Dick McLeod on the sale of his energy guzzling snowmobile. You are really beginning to believe that stuff aren't you?

Congratulations to Carol Masserant for finding out she can have an Energy Environment Game workshop sponsored by Detroit Edison - contact Cindy Larry (237-8274).

A special frame will be sent to Walt Stellberger for the letter he received from his curriculum Administrator for attending the Energy Conservation Workshops.

APPENDIX C

Literature Review

INNOVATION AND CHANGE IN THE SCHOOL MILIEU: A FUTURE DIRECTION FOR THE DIFFUSION OF ENERGY EDUCATION

PROCESS OF CHANGE AND INNOVATION

Educational change is a phenomenon which entails a series of actions or operations leading toward growth in the system with a particular advantageous result. The process of innovation and change entails the development and implementation of new technologies and procedures involving improved curricular frameworks, learning experiences, teaching procedures, or new methods of organization.

Abbott (1975) suggests that innovation and change, as a qualitative change effectuating a restructuring of relationships or participant experiences, represent an important mechanism employed by the school organization to adapt to its environment. Deal, Meyer, and Scott (1975) indicate that educational innovations can be classified as instructural or organizational, and that those changes in instructional approaches or organizational arrangements which increase the complexity of the classroom may be considered innovative.

An important factor in the change process is brought forth by Mann (1976) when he states that "planning change, legislating change, promulgating change, packaging change, training for change all fall short of the mark of actually changing." If the intent is to bring about educational change, Porter (1976) indicates that those interested in initiating change should enter the system and endeavor to utilize strategies whereby change is sought from within the system. The aim must be to thereby create the impetus for change and thus establish an environment which reacts positively to change. He argues that:

> "The effectiveness of innovation, no matter at what level it is initiated in a school organization, is dependent on the extent to which the people concerned perceive a problem and hence realize the existence of a need, are knowledgeable about a range of alternative solutions, and

feel themselves to be in a congenial organizational climate.".

Those who are the target of the innovation must discern the discrepancy and develop a desire to accommodate the current system, and feel that for any necessary changes assistance will be available.

Many innovations which are proposed by an administration, as Sieber (1975) suggests, are frequently resisted by teachers as a result of their fear that various aspects of their professional autonomy will be restricted further. Administrative efforts at innovation and change may be rejected despite the possibility of their better serving educational needs as a result on the part of the teachers being desirous to preserve what they feel to be the small measure of authority, and expertise which they currently possess.

Bennis, Benne, Chin, and Corey (1976) express the belief that a necessary part of the change process is the structuring of new relationships which support and effectuate the participation in processes of change. This requires coordinated effort on the part of those directing the change process. Nevertheless, this has generally not been the case. Deal, et al. (1975) expressed the belief that the adoption of innovation has been largely unsystematic and uncoordinated. This has resulted in the adoption of innovations without the proper organizational support necessary for suitable implementation and long term installation. Orlosky and Smith (1972) concluded from their study of sixty-three educational innovations during the previous seventy-five years that "the lack of a diffusion system will lead to abortive change."

SYSTEMS, SUBSYSTEMS, AND INTERACTIONS

If an effective change organizational structure and implementation process is to be formulated then those involved must take into account the educational organization as a system. In light of this Bennis, et al. (1976) have indicated that the various levels and units of the educational organization which are to be involved in the change process cannot be dealt with adequately in arbitrary

isolation one from the other. Educational organizations, consisting of persons, groups, and intergroup complexes, are in reality overlaping open systems. The complex web of interdependencies which must thus be taken into account in order to observe, diagnose, and intervene into the processes of planned change necessitates the utilization of the mental process of systems analysis.

Thus, as Baldridge and Deal (1975) exhort, educational organizations consist of such complex networks that it is unreasonable to think about change processes without first examining the various subsystems. Unruh (1975) argues that since curriculum development involves not a single system but a combination of interacting systems and subsystems, it is necessary to utilize systems concepts in the search for relationships and procedures for optimizing the interaction of components. It is through the use of a systems approach that the interactions of the factors and participants engaged in the process are understood such that the processes necessary to organize, integrate, and manage those components are apprehended and formulated.

The utilization of this more wholistic approach has important ramifications with the change process. Baldridge and Deal (1975) indicate that changes in an organization are likely to involve more than one subsystem due to the inherent property that various organizational subsystems are related in systematic ways. Educational change must, therefore, involve all the subsystems which collectively comprise any complex educational organization in the process. Any strategy intended to result in the change of an educational program or organizational structure must be founded upon a careful analysis of possible interconnections, since organizational changes are complex and the effects are interwoven throughout the various subsystems. Porter (1976) argues that when the need is for a change on a system level the disregard of the interaction which takes place between individuals and structures involved in educational manpower functions within the institution is unrealistic.

Curriculum, instruction, and inservice education should be viewed, in the opinion of Edelfelt and Smith (1978), in the context of the school as a social system having its own norms and characteristics. In their work with the school systems they found that with only one or a few teachers from any particular school participating in the implementation of change, it was difficult it not impossible to change the way in which the school operated. Beyond this, it has been aptly pointed out by Mann (1976) that in the case of educational change questions of values and of power are an important and fundamental aspect of the change process. The behaviors, the beliefs, and the resultant purposeful action of an individual within an organizational setting is a function of both his role and his personality and thus Porter (1976) attests that "for any program in planned educational change to be successful, policy makers must give attention to the reality that both personal needs and organizational requirements equally effect the process and must be catered for." This becomes clear if one realizes that individuals within an organization have a role and role expectations which influence their behavior as well as having their own personalities and need dispositions.

Curriculum development and inservice education are part of a school milieu, and are inseparable functions if innovation and change is the goal. They exist in an ecological balance whereby a change in one element effects all the other elements. Edelfelt and Smith (1978) believe that curriculum development and inservice education must be approached in a multidimensional perspective such that factors which influence the people and circumstances of school are taken into consideration. Although the consideration of multidimensions and their interrelationships is much more complex, it must be realized that the entire enterprise of schooling is so interwoven that it is unrealistic to reduce it to a single line sequence.

Edelfelt and Smith (1978) point out that in contrast to the multidimensional approach proposed, most recently employed models of curriculum develop-

ment have consisted of a linear, single-dimension sequence of activities. Involvement in interaction with only a couple of the applicable dimensions, as has been done in the past with our attention devoted mainly toward curriculum content and method, will not have much impact unless other dimensions affecting the process of change are also dealt with at the same time. Potential for improvement in our understanding of the subsystems involved and their interaction lies in the research being conducted at the descriptive level for the Institute for Research on Teaching concerning how teachers plan and how they determine the content to be taught. With exploration of other important concepts and relationships involved in the educational process based upon a normative as well as descriptive approach there will be a much stronger foundation for the use of a systems approach. Abbott (1975) points out that "a systems approach to organizational analysis is one in which the functioning of the organization is considered in terms of a continuous series of transactions between that organization and its supporting environment." It is through the use of this type of process, resulting in a more wholistic approach, that the likelihood of successful change is increased.

While this view, as suggested by Unruh (1975), results in the curriculum development process becoming more responsive to the need for interrelating curriculum and environmental factors, and participants, there must be a realization that there is thus a need for organizational coordination and control. Deal, et al. (1975) have indicated it would be doubtful that an innovation could be supported or maintained without formal and systematic linkages with other levels having potential effect upon the educational system such that the more complex and sophisticated modifications in instruction for the organizational patterns which are encouraged by the climate of innovation could be sustained. The concepts needed for an understanding of such a process have been formulated by Havelock (1973) with some studies,

such as those by Zimmerman and Simon (1979) as well as Welliver and Rabinovich (1979), examining aspects of their implementation.

MANAGEMENT OF THE PROCESS

An abundance of resources and new instructional programs cannot, by themselves, bring about a desired change. The implementation of an innovative change requires an understanding of the change processes in educational organizations. This involves a comprehensive organizational perspective which includes an understanding of the crucial organizational subsystems processes involved in innovation, as well as a familiarity with strategies that can be used to cause and support educational changes.

The processes of change as well as the necessary conceptualizations have not always been understood which has resulted in the utilization of strategies which have been very limited conceptually. Chin and Benne (1976) have indicated that one element and all approaches to planned change has been "the conscious utilization and application of knowledge as an instrument or tool for modifying patterns and institutions of practice." An example of the utilization of strategy for change is the academic year workshop on energy conducted by Lindbeck (1979). A data analysis indicated that there had been a significant increase in the knowledge of the energy alternatives and the economic and political-social ramifications presented during the academic year. It was concluded that an academic year workshop can be successful in providing the subject-matter background in energy required by secondary science teachers. However, the processes of introducing planned changes into institutionalized practice, whether the focus is upon the introduction of what Chin and Benne (1976) refer to as more effective "thing technologies" or "people technologies", must be based upon a knowledge of change whereby an understanding of people technologies is utilized. Each of the strategies for inducing change in education which are briefly examined in the following

paragraphs rests upon a major assumption about the motivations of practitioners. This analysis will form a basis from which to discuss future directions in the process of change.

The fundamental assumption underlying the "empirical-rational" strategies is that men are rational. Chin and Benne (1976) point out that "this appeal to a combination of research and education of the public has worked in many areas of new knowledge-based thing technologies where almost universal readiness for accepting the new technology was already present in the population". Sieber (1975) submits that since the major need of the practitioner is believed to be information the resultant one-way communication between the change agent and the practitioner is seen as being efficient. However the utilization of this strategy overlooks the requirement that those leading the change process about the practitioners values and organizational circumstances by means of two-way communication.

Strategies which are based upon the application of power in some form are referred to by Chin and Benne (1976) as the "power-coercive" strategies. The strategists of change seek to mass political and economic power behind the change goals which have been decided are desirable through an influence process basically involving the compliance of those with less power to the plans, directions, and leadership of those with greater power. Sieber (1975) refers to this as the "powerless participant" strategy and argues that it is derived from the notion that practitioners are powerless to innovate. However, there is very little energy devoted to the realization that the practitioners, even though influence may be provided through the bureaucratic channels of the educational system with directives flowing downward and evidence of compliance flowing upward, are by no means powerless to shape their organizational setting. It must be noted, however, that the power they exercise may not be exerted in behalf of rational innovation.

An alternative strategy suggested by Sieber (1975) involves the participation of members of the system in the change process. This "cooperator" strategy rests upon the assumption that practitioners are willing and able to cooperate in new ventures. However, barring the development of a widespread system of what Sieber refers to as "extension agents", the extent of the implementation and utilization of the innovation is probably limited. An analogous strategy which Fullan (1972) refers to as the "collaborative mode" presupposes a high receptivity to change at the user level as well as beyond the user level. This mode of intervention is appropriate where numerous people and both the user and administrative levels are interested in collaborating. While there may be some general receptivity to change at the user level, and some desire for change beyond the user level, it is not necessarily an indication of a clear concensus and homogeneous set of values. For even when individuals intend to or are receptive to change, they often do not change because of the constraints of existing roles and social patterns.

The "normative-re-educative" strategy referred to by Chin and Benne (1976) is founded on the belief that any change in the pattern of practice or action of a participant will occur only as the individuals involved are brought to change their normative orientations. This type of orientation change will involve not only changes in knowledge, information, or intellectual rationales for action and practice, but will also involve changes in attitudes, values, and skills. Changes in patterns of action or practice involve alterations at the sociocultural level in the normative structures and in institutionalized roles and relationships. Moreover, not only is the rational information equipment of men involved, the habits and values at the personal level are also involved in the change process. Similarly, Sieber (1975) argues that what is needed is the strategy of the "status-occupant" whereby it is assumed that the participants are embedded in a complex network of role relationships that retains its patterned configuration as a consequence of shared values,

shared solutions to status problems, and shared sanctions for deviance and conformity. Within this type of social structure any effort to change one component without consideration of the other components frequently results in failure.

Porter (1976) has argued that the early American efforts in innovation and change ignore the complex realities of those organizations as dynamic political systems encompassing individual roles and role expectations through the application of processes directed at changing the organizations by merely changing individuals. An important characteristic of social systems is that both the individuals involved in the organizational relationships must be considered in the process of educational change which involves individuals within organizations. Mann (1976) has suggested that neither the individuals within educational systems nor the schools as organizations represent pure enough concentrations of the properties assumed to exist with the use of past processes of change to allow strategies based almost exclusively on those assumptions to work. The value systems of professionals and quasi-professionals in schools have not been sufficiently consensual to allow change-agent strategies based upon these limited assumptions to be successful.

Evans (1978) points out that "any serious attempt to implement substantial changes in science education must be preceded by a comprehensive plan, and the plan should be viewed as an integral part of a delineated model for change". It is the viewpoint of Chin and Benne (1976) that if changes in a system are to be reality oriented they must take the form of problem solving processes. Fullan (1972) has indicated that the appropriate mode of change would be "focused problem-posing" where the first step, based upon the assumption that the receptivity to change is low at the user level and high beyond the user level, would be to increase the awareness of those

involved as to what the problem is.

Porter (1976) has noted that more recently there has been an attempt to bring part of the organization to the workshop through the recruitment of teams composed of individuals in different role positions within the organization in an effort to tap the formal power structure. Moreover, in many cases provision has been made for the continuous financial and consultative support necessary from an outside organization for the continued utilization of an innovation. The USMES team approach is an excellent example of this strategy.

The need to provide models of new behavior which the program of change aims to present to the participants is suggested by Mohan and Hull (1975). An approach such as this is based in the view of Bailey and James (1978) upon the assumption that "no amount of theory about the design of the curriculum, the methods of instruction, or the improvement of teaching, can substitute for direct "hands-on" experiences with the student materials".

The research of Welliver and Rabinovich (1979) which was based upon the conceptualizations developed by Havelock (1973) supported the contention that a specialized function should be inserted between the research-development process and the practitioner-user in order to bridge the gap which exists between them. This model introduces a specialized function for linkage, referred to as the dissemination-utilization domain, between the research and development process and the user of the innovation.

An important concept for any endeavor aimed at innovation and change is that of the change agent. Havelock (1973) believes that these individuals serve as a catalyst and resource linker through the energizing of the problem-solving process as the result of their occasioning a problematic situation. Once attention is focused upon a problem they bring people together, and assist in finding and making the best use of resources inside and outside their own systems. Moreover, Rogers and Svenning (1969) argue

that the most useful change agent is the individual who is an integral part of the system for which change is intended. There tends to be a greater potential for success since there is thus a better understanding of the system and the specific needs of its members applied to the problem.

Utilizing the concepts thus developed of teams and of change agents Porter (1976) has suggested the formation of change-agent teams. Through their representation of different organization of roles within an educational system these teams would have great potential once specifically trained to analyze and attack the problems of change in their own systems. The training for change-agent teams should enable the participants to understand the nature of change in educational systems, as well as provide them with personal experience in using the innovations themselves.

Moreover, these change-agent teams can provide the nucleus for a program to train the school personnel who are to use the innovation. In particular, Bailey and James (1978) suggest that the classroom teachers which are members of the team and who are competent with respect to the innovation and possess the necessary leadership skills, can be effective leaders for the training of other teachers in the implementation of new programs at the local level. This is seen as an appealing approach due to its multiplier effect in addition to the realization that a classroom teacher brings credibility to any inservice effort.

GENERATING SELF-RENEWAL

If we are to meet future challenges our educational systems must be prepared to change, to adapt, and to solve problems. In order to create and perpetuate change models which are primarily self-renewing, Porter (1976) argues that "potential innovators must themselves be able to analyze the structural and political configurations of their own organizations and their environments". The intent of the change-agent leadership training must be

to shift to the individuals within the system the burden of pursuing their own education. Gardner (1964) has pointed out that in the ever-renewing society what matures is a system or framework within which continuous innovation, renewal and rebirth can occur. The intent should be to develop within each change-agent the kind of understanding which will provide for continuous change in growth such that a collective intellectual system will have been fashioned which provides for its own continuous renewal.

It is important that in-service education be thought of as staff renewal if there is to be a viable potential for change. Bunker (1977) suggests that the purposes of staff renewal should be "to help teachers and administrators articulate goals, uncover real problems to solve, find resources in their own ranks, learn new interactions among one another and with children, and to grow in the ability to be self-sustaining and less dependent on ouside help for growth". Baldridge and Deal (1975) expressed a view that has a constant undertaking leadership should be provided for the formation of organizations with reserves of expertise and resources to sustain long-range problem solving through the flexibility of the organizations to respond to their environment. They argue that "we must be in the business of creating organizations with built-in capacities for assessing needs and creating viable alternatives".

Thus, the only assurance that the potential for change will continue is what Havelock (1973) refers to as the "internalization" of the change process. The goal of the change-agent should be to lead the participant in change towards self-help and responsibility in the maintenance of the innovation. Edelfelt and Smith (1978) see the commitment and understanding developed through involvement as an essential aspect for the continuation of innovation.

UTILIZATION IS ACTION-ORIENTED

A systems approach within the framework proposed is action-oriented. Unruh (1975) argues that "it requires planning and action to be accomplished in a manner that allows participants to revise the plans, as action and

experience proceed, and incorporate constructive improvements." Merely fostering change is not enough in the view of Porter (1976), the important aspect of follow-up cannot be neglected. It is imperative that once someone has been given the experience, or an education, or a grant, that there must be concern, given and an effort put forth for the political and structural protection of innovations.

Bibliography

Abbott, Max G. "The School as Social Systems: Indicators for Change." In J. Victor Baldridge & Terrance E. Deal (Eds.), Managing Change in Educational Organizations. Berkeley: McCutchan, 1975.

Bailey, Gerald D. & James, Robert K. "Model for an Inservice Science Teacher Training Program". Science Education, 62 (1978), 47-52.

Baldridge, J. Victor & Deal, Terrence E. "Overview of Change Processes in Educational Organizations." In J. Victor Baldridge & Terrence E. Deal (Eds.), Managing Change in Educational Organizations. Berkeley: McCutchan, 1975.

Bennis, Warren G; Benne, Kenneth D.; Chin, Robert; & Corey, Kenneth E. The Planning of Change. New York: Holt, Rinehart and Winston, 1976.

Bunker, R. Mason. "Beyond Inservice: Toward Staff Renewal". Journal of Teacher Education, 28 (March/April, 1977), 31-34.

Chin, Robert & Benne, Kenneth D. "General Strategies for Effecting Change in Human Systems." In Bennis, Warren G.; Benne, Kenneth D.; Chin, Robert; & Corey, Kenneth E. The Planning of Change. New York: Holt, Rinehart and Winston, 1976.

Deal, Terrence E., Meyer, John W. & Scott, W. Richard. "Organizational Influences on Educational Innovation." In J. Victor Baldridge & Terrence E. Deal (Eds.), Managing Change in Educational Organizations. Berkeley: McCutchan, 1975.

Edelfelt, Roy A. & Smith, E. Brooks (Eds.) Breakaway Multidimensional Approaches. Integrating Curriculum Development and Inservice Education. Washington, D. C.: Association of Teacher Educators, 1978. (ED-160-577).

Evans, Thomas P. "Bringing About Change in Science Education". In Abraham, Michael R. (Ed.) Science Education/Society: A Guide to Interaction and Influence. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education, 1978.

Fullan, M. "Overview of the Innovative Process and the User". Interchange, 3 (1972), 1-46.

Gardner, John W. Self-Renewal. New York: Harper & Row, 1964.

APPENDIX D

Summary of Achievement Milestones

1st Quarterly Milestones
January 1 - March 31, 1978

IMPLEMENTATION PLAN PROGRESS

(Follows original plan p. 28 - 39)

A. START-UP ACTIVITIES

1. Implementation Plan was submitted and approved as revised in December.

2. Staff

   d. Major staff hiring was completed in January with the last regional coordinator starting work February 13.

   e. Staff training of new staff was conducted January 4 and 5 with follow up given at monthly meetings and as needed.

3. Regional Advisory Committees

   c. Selection of committee members was late. Region II had first meeting in March. The other three regions are in process of early April meetings of advisory committees.

4. Teaching curriculum materials.

   a. Materials developed:

      1. Teacher's Guide
      2. Today is Tomorrow Conserve Energy
      3. Doubling Time
      4. Values and Information on Energy
      5. Charts and graphs

      Materials purchased or obtained from other sources:

      1. The Household Energy Game
      2. How a Bill Becomes a Law
      3. Mini-Unit 6 - Going Places (Transportation Choices and Oil Supplies)
      4. Mini-Unit 7 - Calories for Heating Our Homes
      5. Project Conserve (IBM cards)
         Home Energy Audit
      6. Energy Conservation in the Home (yellow)
         Home Economics Book
      7. Save Energy Save Dollars
      8. EPA Mileage Charts
      9. Mobile Oil Materials
      10. Michigan Consolidated Gas Material

a. Materials purchased or obtained from other sources: (con't.)

11. Consumer Power Material
12. Board of Water and Light Materials
13. Detroit Edison Material
14. Solar Energy and Your Home
15. What You Should Know About Dayton Hudson Mall

b. Pretest materials in Region II

Data have not been completed to date. All information will be analyzed on next report.

5. Promotional and display materials

a. An energy bicycle, a photovoltaic unit, and a model solar hot water heater are planned and in development stage.

b. Display of Personal Appearance Energy Quiz Board, solar heater and windmills are finished and available for use (nonproject funds used).

c. Idea Sheets - Energy Tip Sheet and Science Fair Idea Sheet were developed and used at March 3-5 workshop. They were revised and are being printed in quantity, (Available in mid-April).

6. Home Energy Audit Forms

Project Conserve forms are being utilized. Pretested by other MSU project. As of April 20, awaiting delivery of revised forms.

7. Transportation Energy Form

a. Planning was done in January and February.

b. Forms pretested in March - over 150 pretests returned.

c. Revised in March and sent to printer March 30. Forms will be ready for use by April 14.

8. Develop Market Factors Feedback Collection

Collection system procedures were discussed on April 7 with regional coordinators.

B. IMPLEMENTATION ACTIVITIES

1. Training Activities

a. MSU Science and Mathematics Teaching Center

1. The plans for the training program are complete, see Appendix A.
   -Day I (as is)
   -Day II one model used in Jackson changed to Day 2 Ingham and Calhoun
   -Day III as is

2. The promotion of the training program and the recruitment of participants from Region II has been completed see Appendix B.

3. The training sessions have been completed for teacher leaders and staff in Region II, see Appendix C.

   Jackson
   4-9:30 p.m. at Jackson Parkside High School
   February 22, 1978
   March 6, 1978
   April 18, 1978

   Ingham
   4-9:30 p.m. at McDonel Hall -- Kiva
   February 27, 1978
   March 13, 1978
   April 19, 1978

   Calhoun
   4-9:30 p.m. at Calhoun Area Vocational Center
   March 1, 1978
   March 20, 1978
   April 17, 1978

b. Regional Awareness Team Training/Region V

Region V Awareness Team Training was postponed to April 4 and 5. Note: 29 from Region V attended March 3-5 State Workshop.

c. State Awareness Team Training

1. Program was planned in January
2. Promotion and recruitment done in February
3. Workshop was held March 3-5
4. Evaluation looked good (See Appendix D)

B. IMPLEMENTATION ACTIVITIES (con't.)

2. State Energy Conference

- January 1979
- Plans indefinite - may be a total energy conference

3. School Programs

a. Planning was done in January and February

b. Contacts made February and March

c. Program in Region III and Region IV scheduled in late March. Region II school activities started in March.

d. Energy Today & Tomorrow Programs were conducted in Regions III and IV.

e. Classroom presentations were started in Region V.

f. Classroom activities started in March

g. No follow-up meetings held because program generally is not that far along.

h. No action at this time

4. Curriculum Materials: No action at this time

5. Home Energy Audits: Not launched as of April 20

6. Exploration Days: Program is out; students are being selected

7. Energy Fairs

a. Idea sheet developed and distributed at March Awareness Team Workshop

b. Workshop on energy fairs one part of March 3-5 conference.

d. Energy activities at three mall shows in Regions II and III in March

8. Other Program Activities

a. Plans are in an early stage for summer programming

b. Plans being developed

C. MARKET FACTORS FEEDBACK: No action at this time

PUBLICATIONS/MATERIALS SCHEDULE

Cooperative Extension Service

- Energy Tip Sheet: "It Makes Good 'Cents' to Save"
  (Preliminary in March, printed copy in April, copy attached)
- Science Fair Idea Sheet
  (Made available March, revised in April, copy attached)
- Transportation Audit
  (Printed in April, copy attached)

Science and Mathematics Teaching Center

- See "Teaching Curriculum Materials" in Implementation Plan Progress, page 3.

INTERIM PROGRESS REPORT
YOUTH ENERGY CONSERVATION PROJECT
April 1 - June 30, 1978

MILESTONE SCHEDULE

A. Start-up Activities

3. Regional Advisory Committees

▼ c. Members selected

▼ d. Functioning in all regions

4. Teaching Curriculum Materials

▼ b. Pretested in Region II

5. Promotional and display materials

▼ b. Several displays completed

6. Home Energy Audit Forms

▼ b. Forms prestested

▼ 8. Market Feedback Collection Procedures

B. Implement Activities

1. Training Activities

a. MSU Science & Math Teaching Center

▼ 3) Training Completed in Region II

3. School Programs

▼ d. Regions III and IV Programs Completed - Phase I

▼ e. Region V Programs Completed - Phase I

▼ f. Region II Teacher - student activities completed - Phase I

▽ g. Follow-up meetings

Comment: Not held due to lateness of Home and Transportation Audits. Also limited support by Advisory Committees for this activity.

lestone Schedule con't.

B. Implement Activities con't.

5. Home Energy Audits

▼ a. All school audit forms processed

▽ b. Follow-up meetings

Comment: Not held due to lateness of Home and Transportation Audits. Also limited support by Advisory Committees for this activity.

6. Exploration Days

▼ a. Students Selected

▼ b. Exploration Days Conducted

▼ c. Energy Days 78 Conducted

7. Energy Fairs

▼ c. Energy Fairs Organized

Comment: Limited mainly to Solar Day, Special Community Events, and Mall Shows.

▽ d. Science Fairs Conducted

Comment: No specific emphasis was given to conducting Science Fairs.

C. Market Factors Feedback

▼ 6. Region V meetings of Awareness Teams for MFF

▽ Indicates Milestone
▼ Indicates Complete Milestone
o Indicates Target Activities
• Indicates Completed Target Activity

Progress Report
Youth Energy Conservation Project
July 1 - September 30, 1978

Milestone Schedule

A. Start-Up Activities

3. Regional Advisory Committees
▽ d. Advisory Committees - some committees have met, others have not during the past quarter.

4. Teaching Curriculum Materials
▼ c. Materials were evaluated and refined.

5. Promotional and Display Materials
▼ d. Other materials were completed
Energy quiz boards

6. Home Energy Audit Forms
▼ c. Computer program revised

B. Implement Activities

1. Training Activities
a. MSU Science and Math Teaching Center
▽ 4. Evaluated and refined teacher training program
▽ 6. Completed two three-day statewide workshops per revised format.
c. State workshops
▽ August workshops completed
note: other workshops October - November

3. School Programs
▼ h. Phase I programs were evaluated
Phase II programs planned
▼ j. Contacts made for Phase II, but is a continuing process.

5. Home Energy Audits
▼ c. Non-school group audits processed

8. Other Program Activities
▽ a. Community action activities completed

C. Market Factors Feedback

7 6. Meetings held

7 Indicates Milestone
7 Indicates Complete Milestone
o Indicates Target Activity
o Indicates Completed Target Activity

3rd Quarterly Report
Oct. 1 - Dec. 31, 1978

Milestone Schedule

3. Regional Advisor Committees
▽ d Plan and Conduct Meetings
Regions II and V met during the quarter
Regions III and IV did not meet

4. Teaching Curriculum Materials
▼ d Produce and distribute in Regions I, III, IV and V
Materials were distributed in Regions I-V

5. Promotional and Display Materials
▼ b Displays completed and available for local use
Quiz Boards made and distributed last quarter
▼ c Idea Sheets
Energy Agree - Disagree completed and distributed to coordinators
▼ d All promotional materials completed
Promotional materials needed were completed

B. IMPLEMENTATION ACTIVITIES

1. Training Activities
a MSU Science & MathTeaching Center
▼ 7) Conduct Regional Workshops - (Completed series of 10 in Nov.)

3. School Programs

1 Institute and conduct new creative approaches in one or more regions
▼ New strategies were tried in REgions II, III, IV, and V

7. Energy Fairs
▼ a Distribute Energy Science Idea Sheets
(Additional Sheets were distributed)

▽ Indicates Milestone

▼ Indicates Completed Milestone

4th Quarterly Report
Jan. 1 - March 31, 1979

MILESTONE SCHEDULE

Workshops - Revised Plan

A ▼ Recruit high school teachers for Region I workshop - Completed February 1979.
▼ Conduct 2 high school teacher workshops in Region I - Completed February 1979.

Completion of Original 15-Month Project

3k ▼ Phase II school programs completed, March 31, 1979

4a ▼ Conduct use of materials in Regions I, II, III, IV, and V. Used materials in all regions.

c ▼ Made materials available nationally. Single copies have been provided upon request to other states.

5e ▼ Home Energy audits launched State-wide - Home Audits assumed by Project Conserve.

7 ▽ Home Energy Fairs. No active role, but had minor role in Energy Fairs in Regions II and IV

c Organize
▽

d Conduct (no active roles assumed)

Project Extension

B ▽ Plan Phase III April 1 - May Program by March 1 - Plans were developed

C ▼ Select elementary & Middle schools to test materials and approaches -- Schools were selected

▽ Indicates Milestone

▼ Indicates Completed Milestone

5th Quarterly Report
April 1 - June 30, 1979

xtension of Project Milestones - Cooperative Extension Service Component

▼ Plan Phase IV - June, July, August programs

Planning Completed

▼ Develop 3 single concept sheets for elementary age designed for parent involvement.

6 Different sheets were developed. The titles are:

Energy Idea Sheet (for teachers)
Family Energy Saver Contest
Energy Match
Energy Word Find
Energy Find
Energy Crossword

▼ Complete Phase III April - May program with schools.

Phase III Programs were completed at the end of the school year.

2 Coordinators and 2 graduate assistants were terminated from the project.

Recruit and Train Summer Energy Teams in Regions III and II

Team was recruited in Region III and given preliminary training. No team was recruited in Region II due to the lack of financial and staff support by community agencies.

√ Indicates Milestone

▼ Indicated Completed Milestone

6th Quarterly Report

July 1 - August 31, 1979

Youth Project

Cooperative Extension Service

Milestones

H. Complete Phase IV - June - August Summer Program and terminate all CES Staff - August 31, 1979. One Program was completed and terminated.

Milestone Schedule

Material Development

▼	1. Initial selection and Modification of existing materials	Completed May
▼	2. Development of teacher guide and background material.	Completed May
▼	3. Refinement of materials after initial workshop based on teacher use and staff visits to schools.	Completed June
▽	4. Material Development at writing conference Final revision after 2 1/2 day workshop.	Started in June

Recruitment

▼	1. Spring teacher training.	Completed May
▽	2. Summer 2 1/2 day training model	Started in May
▽	3. September 1 day Regional Workshop	Started in April and continued through Sept.

Workshop and Conference

▼	1. 25 selected teachers from Region II	Completed May

Development of Training Models

▼	1. Developing a workshop for 25 elementary teachers.	Completed April
▼	2. Development of 2 1/2 day workshop model	Started May

July 1 - September 30, 1970

Milestone Schedule

Material Development	
4. Material Development at writing conference. Final revision after 2 1/2 day workshop.	Completed August
Recruitment	
2. Summer 2 1/2 day training model.	Completed in July.
3. September 1 day Regional Workshop.	Completed in September
Workshop and Conference	
2. 2 1/2 day elementary teachers conference mid-August.	Completed August
3. 5 Regional Workshops early September.	Completed September
Development of Training Models	
2. Development of 2 1/2 day workshop model.	Completed August
3. Development of one day elementary teacher workshop model.	Completed August

APPENDIX E

Summary of Rates of Service Activity

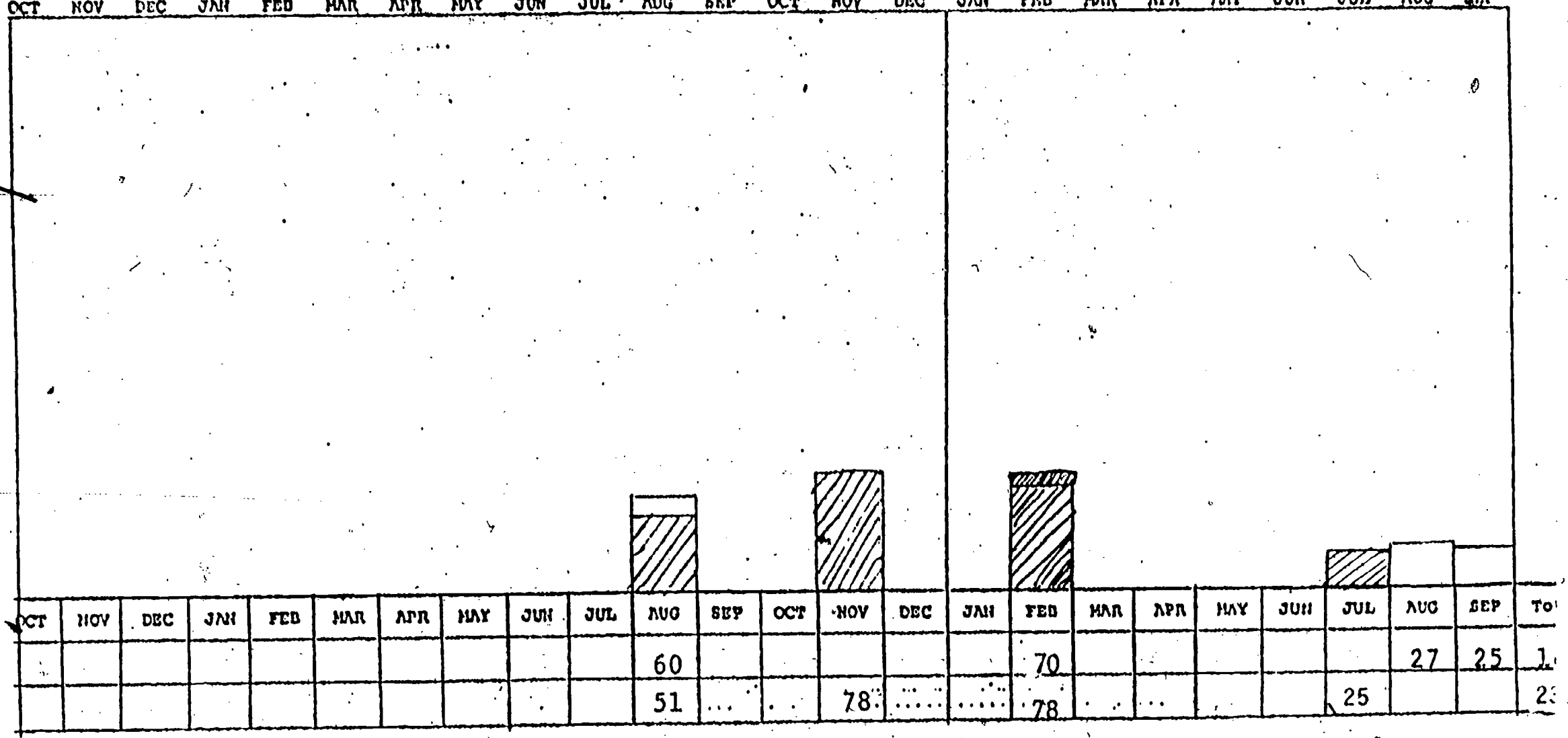
EXHIBIT A

RATE OF SERVICE ACTIVITY:

Region I Training for Teachers

STATE: Michigan

SUBPROGRAM: Youth Project



OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	To
										60						70						27	25	1
										51	...	. .	78	.....	.....	78	. .	..			25			2

Projection

Actual

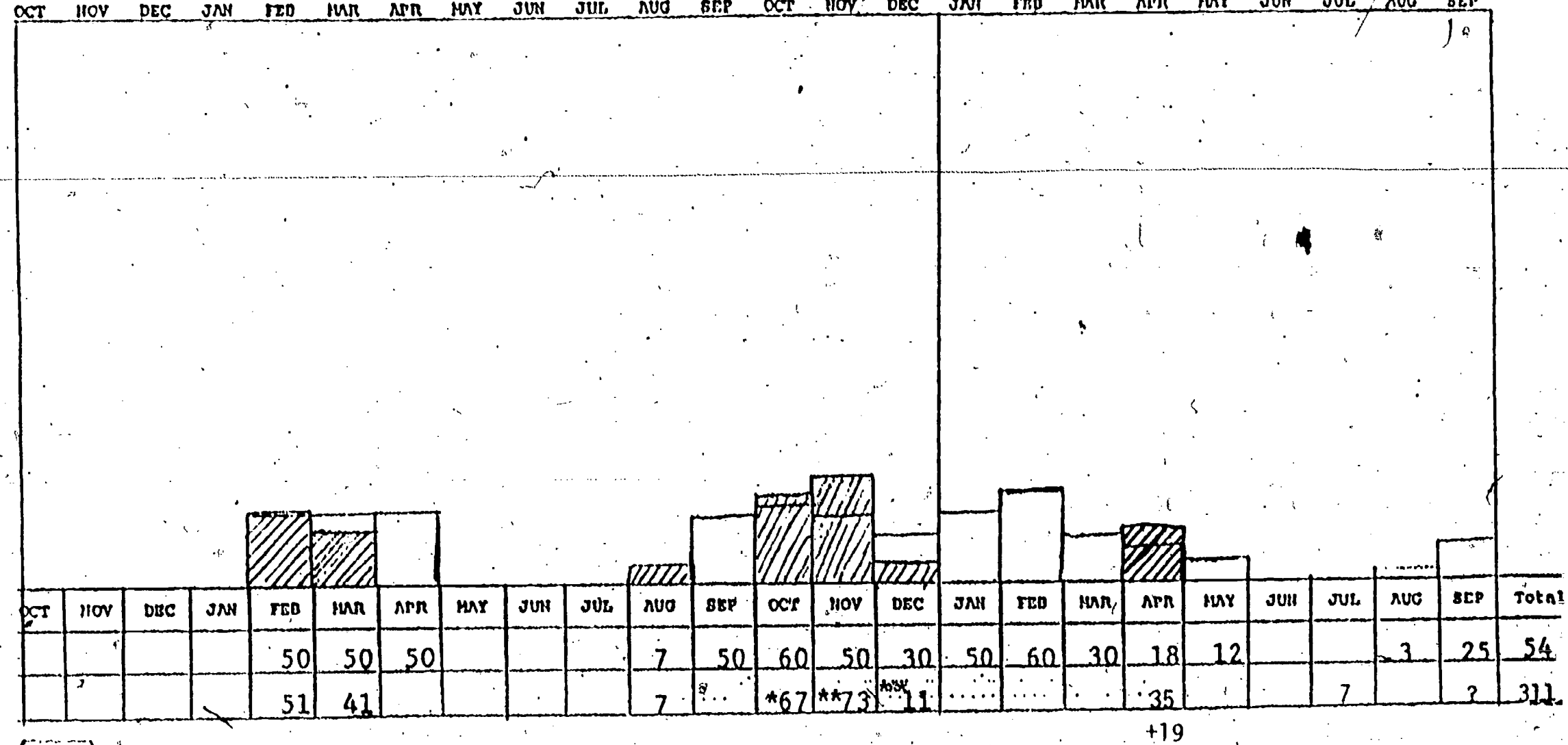
EXHIBIT 4

RATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region II Training for Teachers



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
nnod					50	50	50				7	50	60	50	30	50	60	30	18	12			3	25	54
ual to					51	41					7		*67	**73	*** 11				35			7		?	311
ato																			+19						

Projection

Actual

*Oct.
55 Teacher Workshop
12 Consultant & Comon

**Nov.
21 Inservice
26 Consultant
26 Committee

***Dec.
11 Consultant

April
35 Elementary Teachers - Marge Spawr

Addendum 19. Trained by Science & Math Teaching Center (not included in origina April Report)

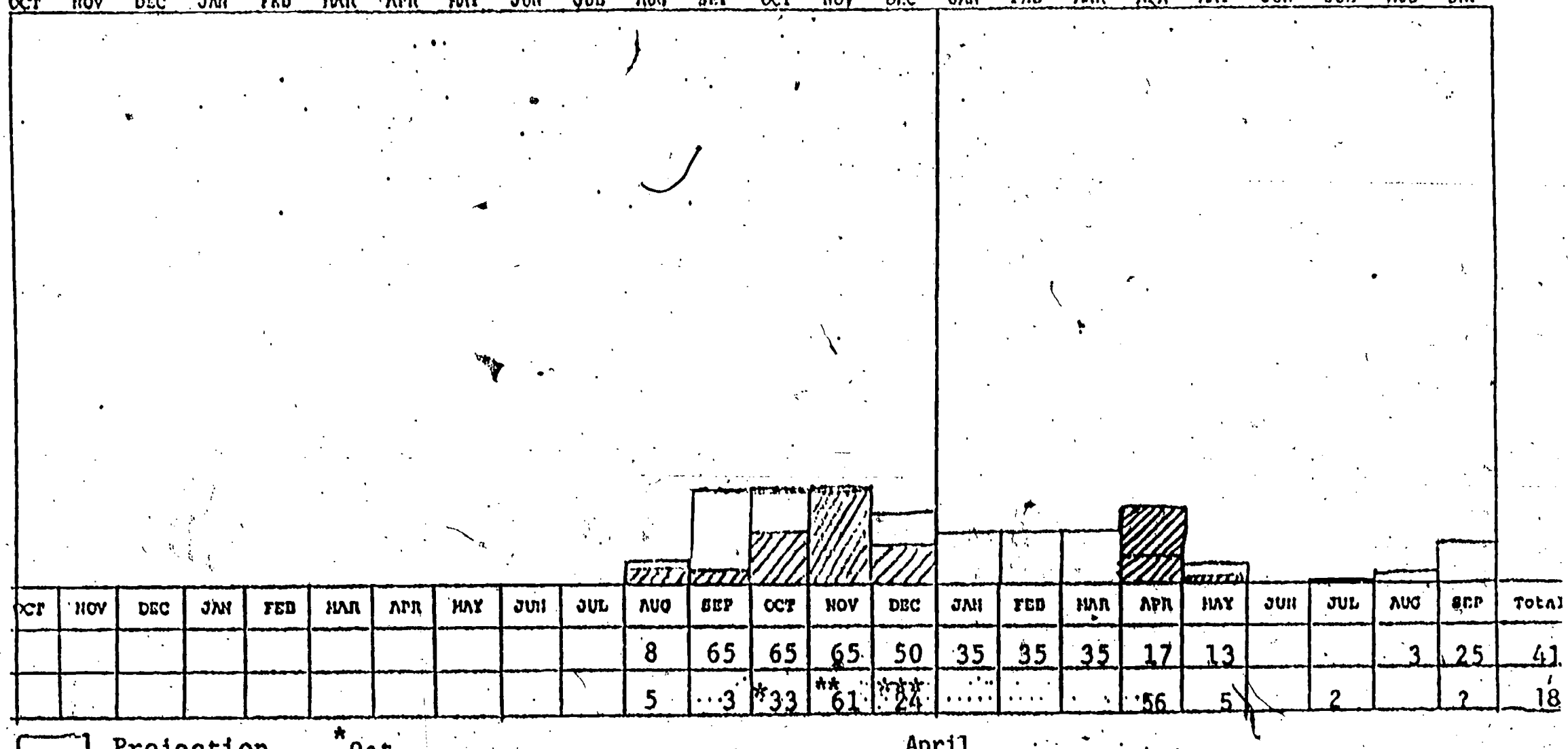
EXHIBIT 4

DATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region III Training for Teachers



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
ed											8	65	65	65	50	35	35	35	17	13			3	25	41
el to te											5	3	*33	**61	***24				56	5		2		2	18

Projection

Actual

* Oct.
33 Consultant & Comm.

** Nov.
32 Workshop
29 Consultant & Comm.

*** Dec.
2 Consultant & Comm.
24 Consultant & Comm.

April
Byron Center 22
Caledonia High School 34

May
Beech Elementary 5

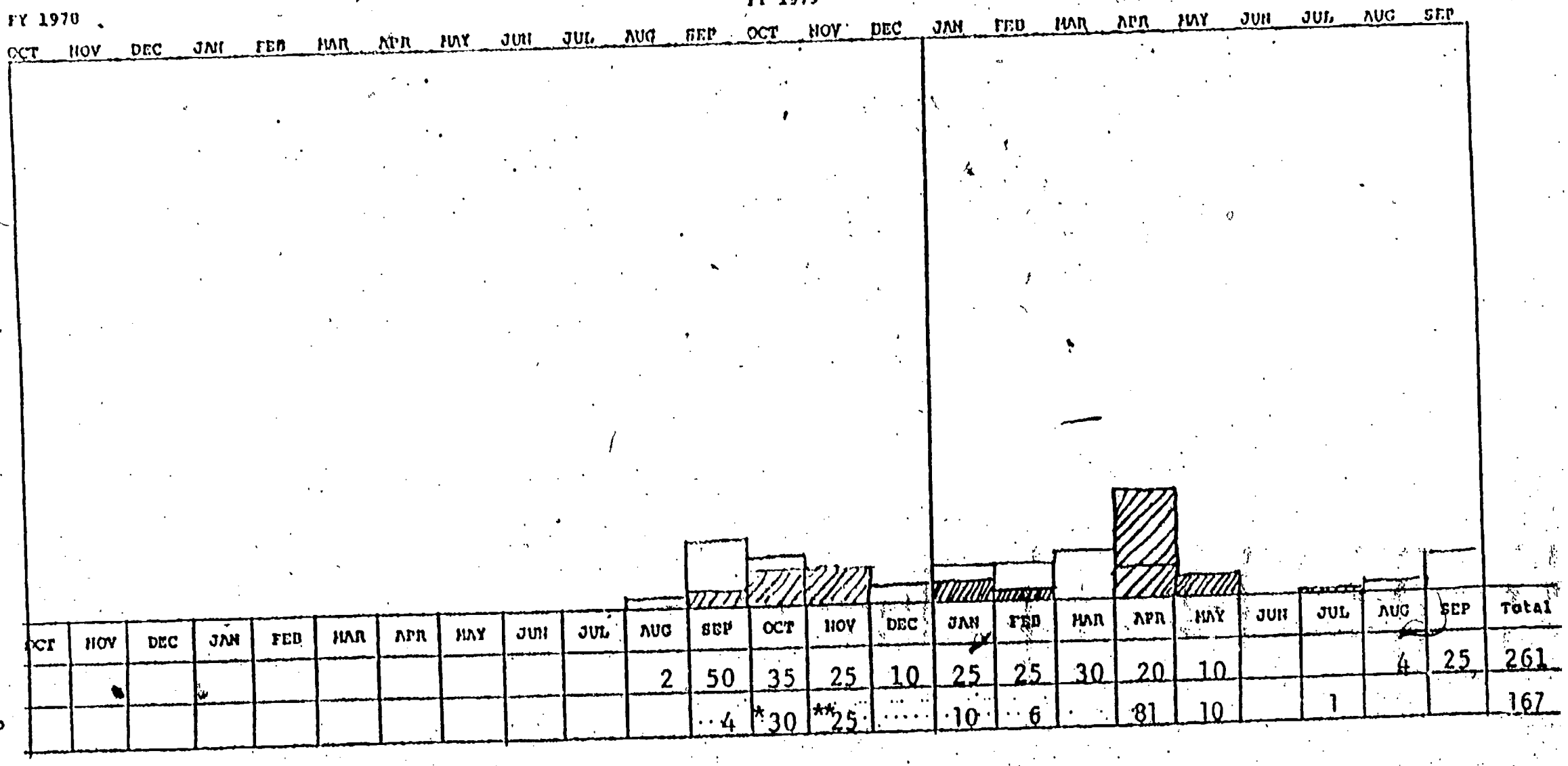
EXHIBIT 4

DATE OF SERVICE ACTIVITY

STATE: Michigan

SUBPROGRAM: Youth Project

Region IV Training for Teachers



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
											2	50	35	25	10	25	25	30	20	10			4	25	261
ined ual to ate												4	*30	**25		10	6		81	10		1			167

Projection

Actual

* Oct.
24 Workshop
5 Consultation

** Nov.
23 Inservice
2 Consultation

April
25 Elk Rapids Elementary
5 Elk Rapids Middle
21 Roscommon Elementary
24 Roscommon Middle
4 Central Lake
2 Boyne Falls

May
5 Kalkaska Elem., Burt St.
5 Mancelona Elemtary

EXHIBIT 4

DATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region V Training for Teachers

FY 1978 — FY 1979

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
										1	25	10	8	8	8	8	8	20	10			3	25	134
to											...	*31	**8	***13	.....	...1	...	...4	8				?	65?

Projection

Actual

* Oct.
27 Workshop
4 Consultant

** Nov.
4 Inservice
4 Consultant

*** Dec.
6 Inservice
7 Consultant

April
3 Lakeview, Negaunee Elementary
1 Marquette Alternative High School

May
6 Parkview Elementary
2 Vandenboom Elementary

134

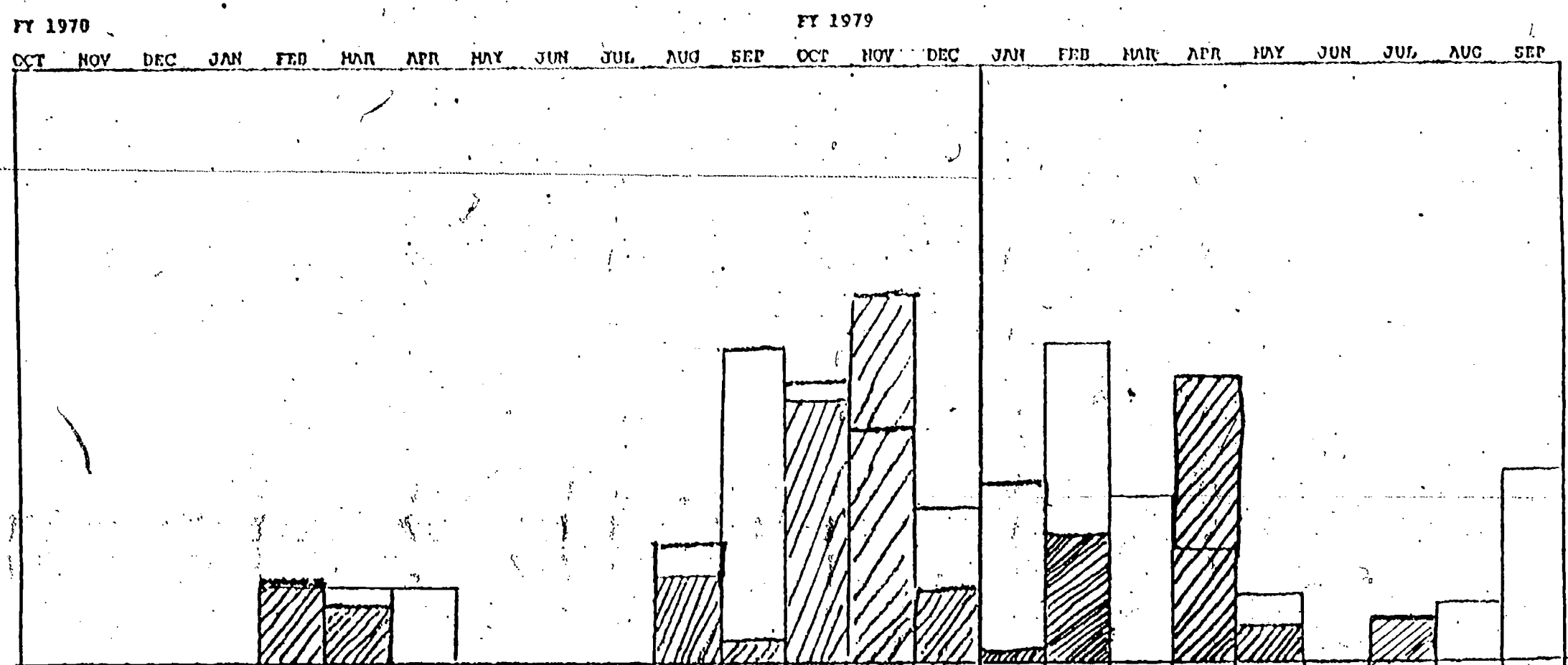
EXHIBIT 4

DATE OF SERVICE ACTIVITY:

Total all Regions Training for Teachers

STATE: Michigan

SUBPROGRAM: Youth Project



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
					50	50	50				78	190	170	148	98	118	198	103	75	45			40	125	1538
to					51	41					63	7	161	245	48	10	85		176	23		35		?	964?

+19 Addendum SMFC April Workshop
195

Projection

Actual

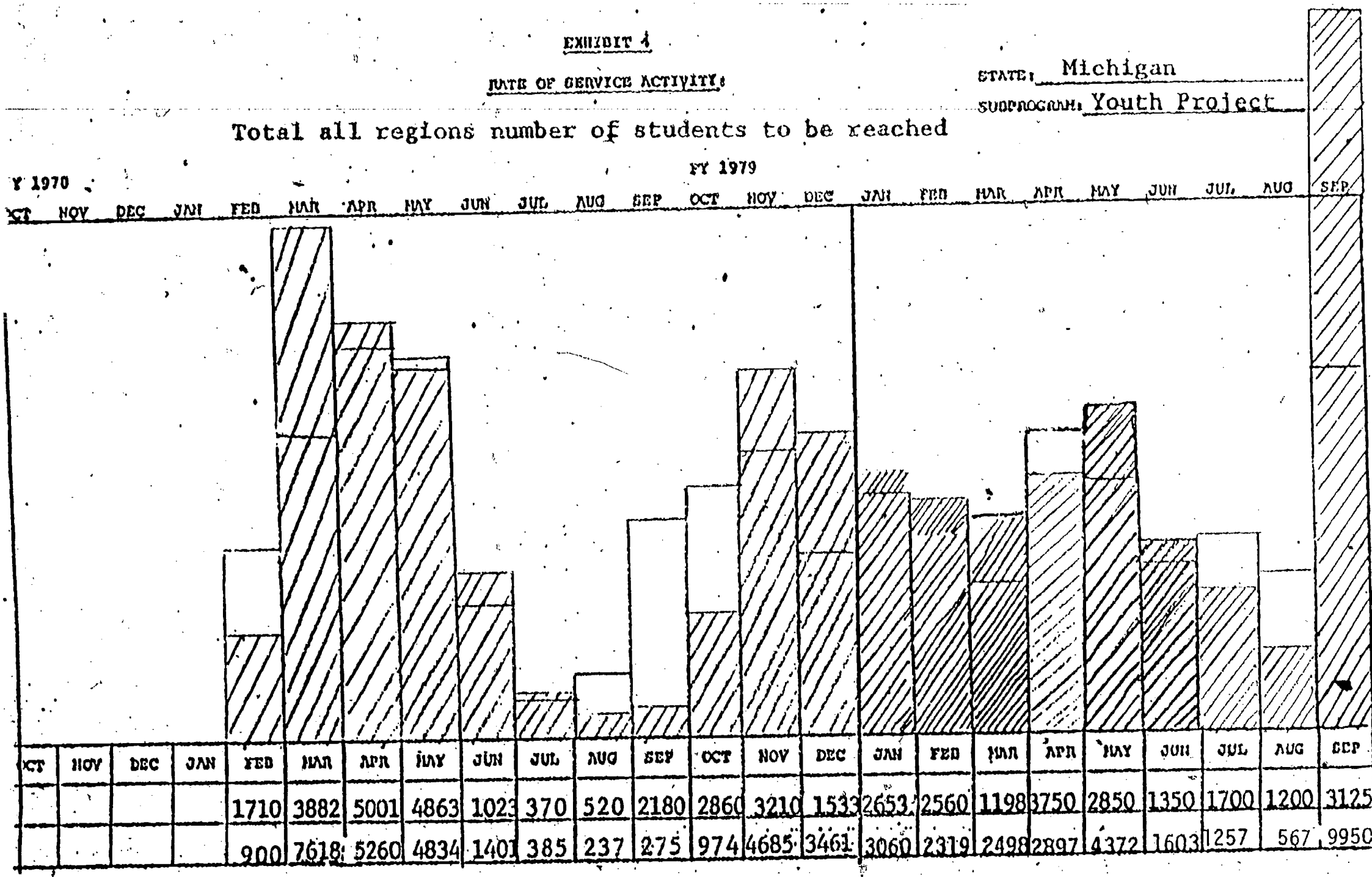
EXHIBIT 4

DATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Total all regions number of students to be reached



OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
				1710	3882	5001	4863	1023	370	520	2180	2860	3210	1533	2653	2560	1198	3750	2850	1350	1700	1200	3125	47,538
				900	7618	5260	4834	1401	385	237	275	974	4685	3461	3060	2319	2498	2897	4372	1603	257	567	9950	58,554

Projection — 27,152 Planned for 1978

Actual — 30,030 Actual for 1978

37,907 Actual for 15 Month Project

46,779 Actual for 18 Month Project

*Reflects Estimates based on July & Sept. SMTC Workshops

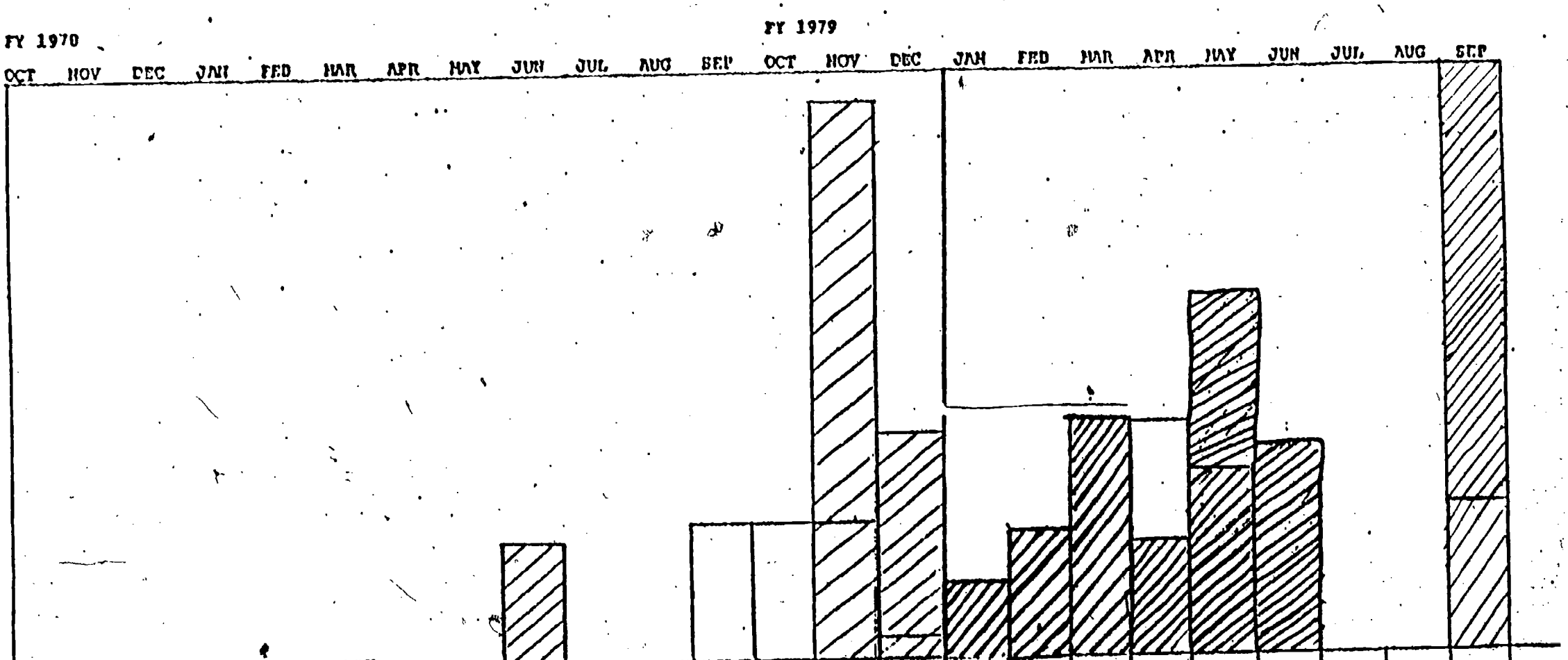
EXHIBIT 4

RATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region I Number of new students to be reached



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Tot
Planned												600	600	600	100	200	200	100	1000	800				625	4825
Actual to Date						17			524					3109	978	260	490	1001	572	1929	883			*3450	13,3

Projection

Actual

1000 Planned for 1978

4628 Actual for 1978

6379 For 15 Month Project

9763 For 18 Month Project

*The September students #'s are based the teachers trained in July & Sept. workshops. Some teachers were middl school & they see 125 students a day & elementary teachers have 25 studen in class.

22 Middle School Teachers

28 Elementary School Teachers

EXHIBIT A

RATE OF SERVICE ACTIVITY

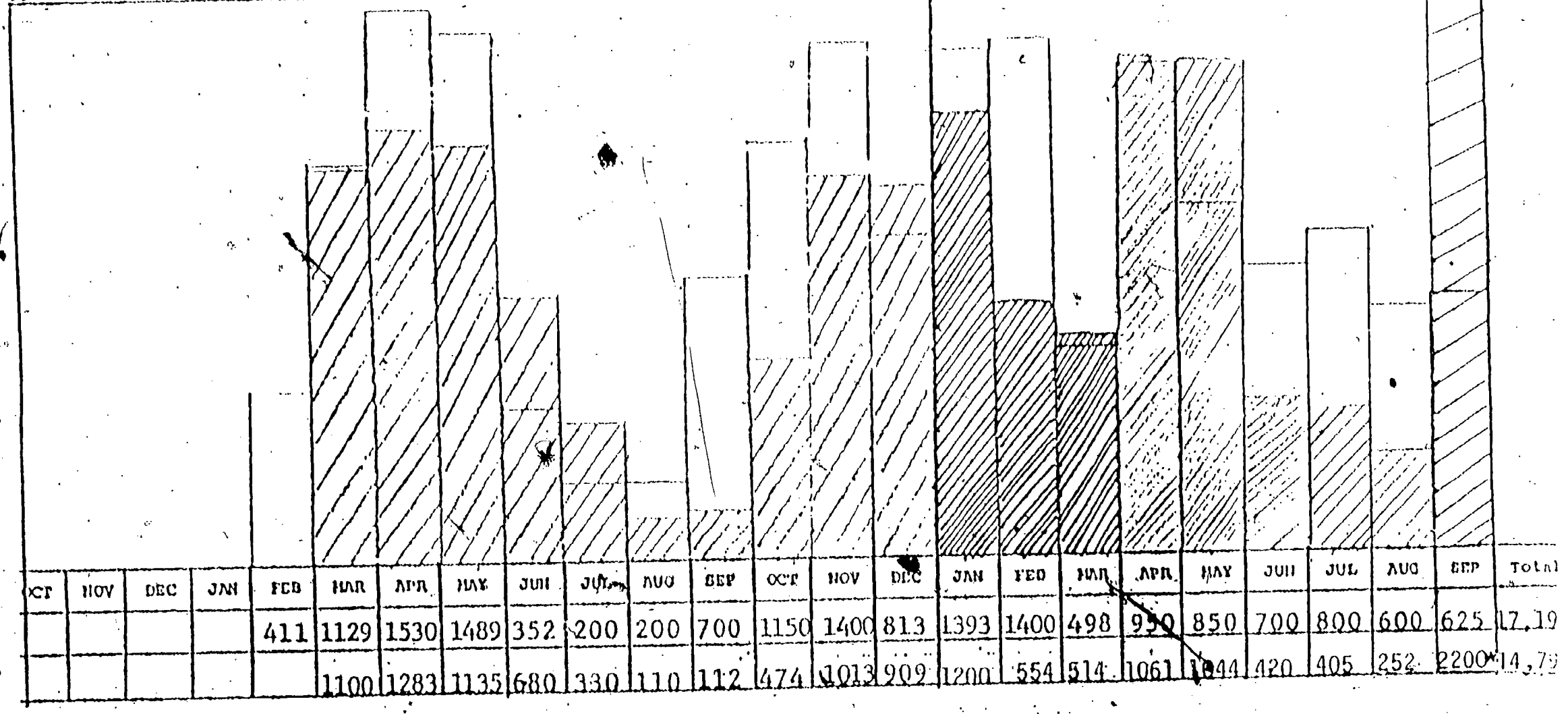
STATE: Michigan

SUBPROGRAM: Youth Project

Region II Number of students to be reached

FY 1979

FY 1970



OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
				411	1129	1530	1489	352	200	200	700	1150	1400	813	1393	1400	498	950	850	700	800	600	625	17,19
					1100	1283	1135	680	330	110	112	474	1013	909	1200	554	514	1061	1044	420	405	252	2200	14,79

od
.1 to
0

Projection — 9374 Planned for 1978

Actual — 7146 Actual for 1978

9414 Actual for 15 Month Project

11,939 Actual for 18 Month Project

*See Region I

14 Middle School teache

18 Elementary teache

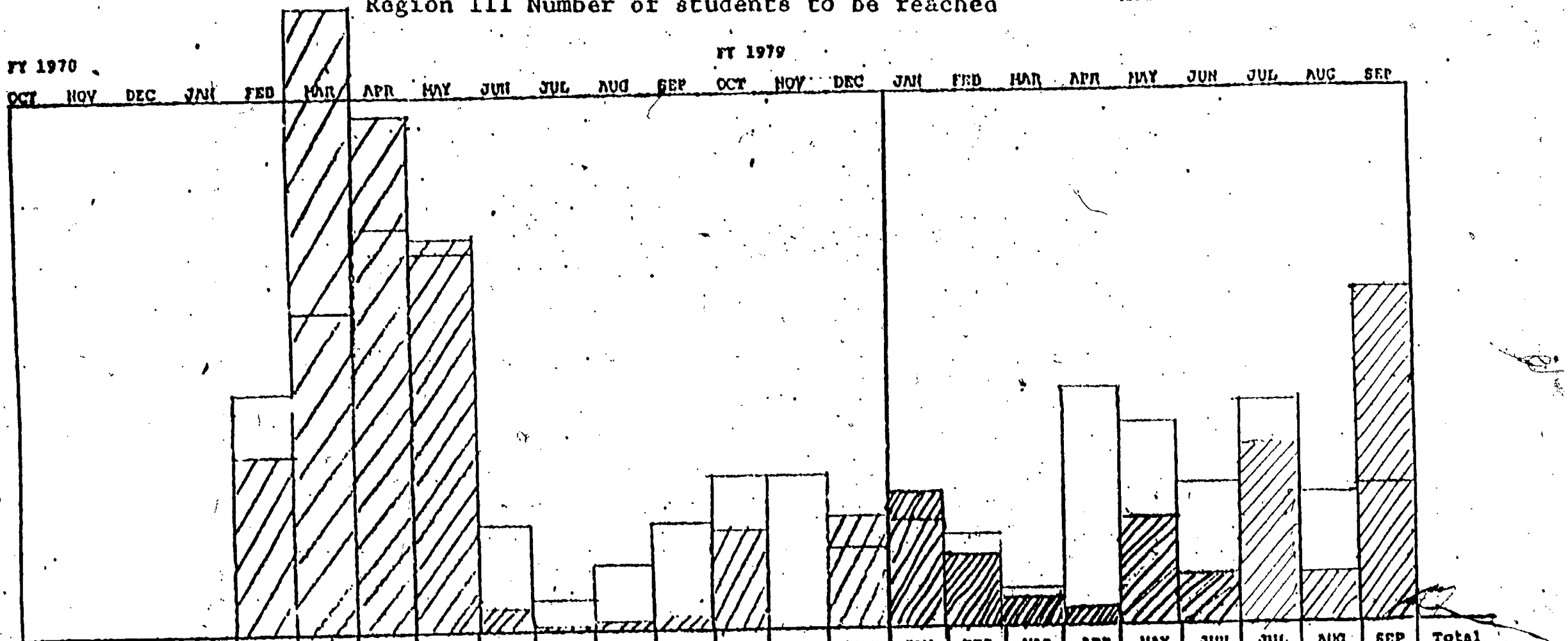
EXHIBIT 4

RATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region III Number of students to be reached



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
					1025	2100	2650	2575	500	100	250	500	700	700	300	500	400	150	1000	800	650	900	600	625 *	17,025
to					870	5505	3369	2619	83	23	31	36	420		515	666	359	120	74	432	176	852	315	1875 **	18,330

Projection — 11,400 Planned for 1978

Actual — 13,471 Actual for 1978

14,616 Actual for 15 Month Project

15,298 Actual for 18 Month Project

** Grand Rapids Home Economists Middle School Program 150 - Sara

* See Region I

12 Middle School Teachers

15 Elementary School Teachers

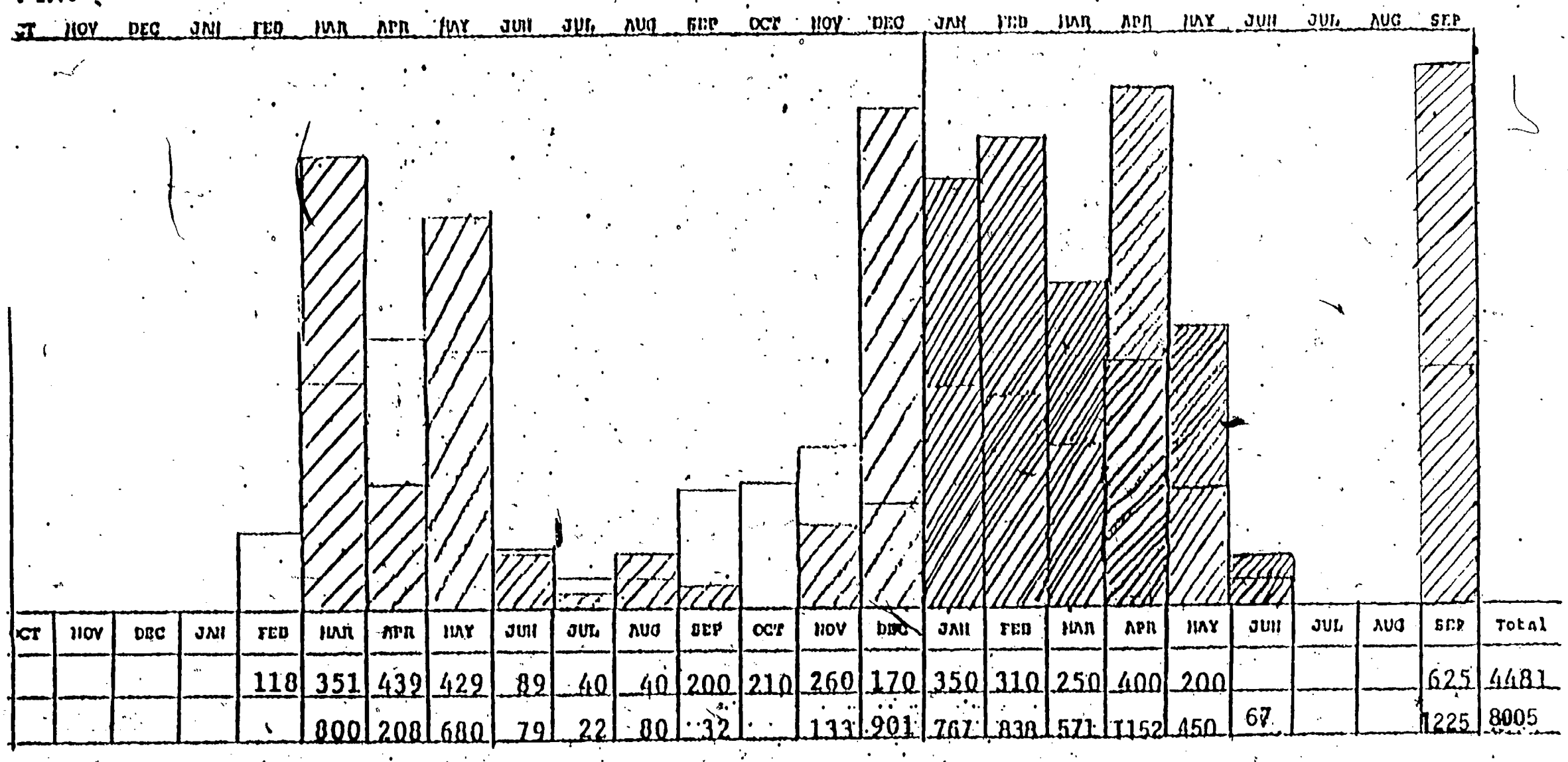
EXHIBIT 4

DATE OF SERVICE ACTIVITY

STATE: Michigan

SUBPROGRAM: Youth Project

Region IV Number of students to be reached



OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
				118	351	439	429	89	40	40	200	210	260	170	350	310	250	400	200				625	4481
					800	208	680	79	22	80	32		133	901	767	838	571	1152	450	67			1225	8005

Projection — 2346 Planned for 1978

Actual — 2935 Actual for 1978

5111 Actual for 15 Month Project

6780 Actual for 18 Month Project

*See Region I

7 Middle School Teachers
14 Elementary School Teachers

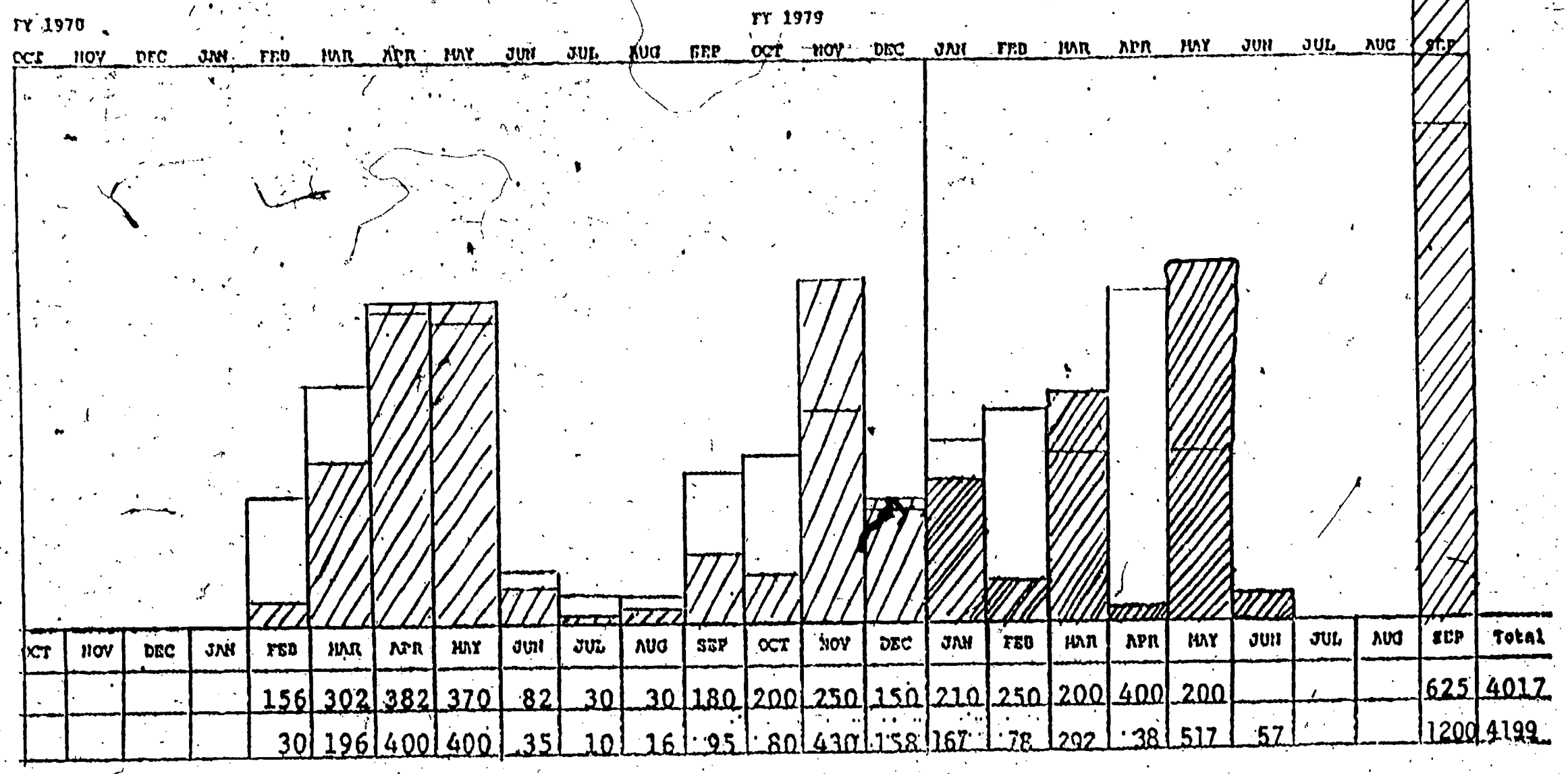
EXHIBIT 4

RATE OF SERVICE ACTIVITY:

STATE: Michigan

SUBPROGRAM: Youth Project

Region V Number of students to be reached



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total
					156	302	382	370	82	30	30	180	200	250	150	210	250	200	400	200				625	4017
					30	196	400	400	35	10	16	95	80	430	158	167	78	292	38	517	57			1200	4199

Projection

Actual

2132 Planned for 1978

1850 Actual for 1978

2387 Actual for 15 Month Project

2999 Actual for 18 Month Project

*See Region I

7 Middle School Teachers

13 Elementary School Teachers

APPENDIX F

Start-up Situations Encountered by 4-H in Region III

SITUATIONS ENCOUNTERED IN THE START-UP OF THE YOUTH ENERGY PROJECT

REGION III

by Sara Paton

Region III (Kent, Muskegon, Oceana Counties)

Project period: January 1, 1978 - August 30, 1979

Target group: High school age youth and their families

Original Objectives: To reach 50,000 high school age youth in 5 target regions throughout the state of Michigan.

1) to install an "energy conservation ethic" in these target youth
2) to effect a 5% decrease in the energy consumption of these youth and their families in 1/2 of the target group (25,000)

As the project developed, some of the actual numbers were changed.

The remainder of this supplement will deal with specific situations encountered when the schools are used as the vehicle for project development and completion.

I. Getting Started

- A. Initial contacts
  - 1. Intermediate school districts
  - 2. Superintendents and their staffs
  - 3. Principals
- B. Working into the system with a new project
  - 1. Teachers
  - 2. Committees
  - 3. Clubs and groups
  - 4. Students

II. Specific Situations

- A. Project credibility
- B. Government's reputation in educational projects
- C. Assemblies: pro and con
- D. Whitehall High School: An Energy Conservation Class
- E. Materials and support system
- F. Reaching teachers the first time
  - 1. Large group presentations
  - 2. One to one contacts
  - 3. Dept. Chairmen meetings
- G. Rural and urban settings - Does it make a difference?

I. Getting started

A. Initial contacts

1. ISD'S - This contact with the ISD in each county proved to be valuable in many ways. These offices are a source of films, meeting rooms, materials, and perhaps most important, they have established contacts with the administrative personnel at all the schools in the district. This is a good place to gain the support of the staff to help carry the project into the schools. In some intermediate school districts, there are area specific personnel that will help further. Such as environmental education or vocational ed. coordinators.

2. Superintendents of Schools and their staffs - I found that a short visit with the superintendent of each school involved can be of some help, but more of a courtesy to them and their staff. These people like to know what is going on in their schools, but usually immediately delegate responsiblity for a special project to the principal. Specialized staff people, such as superintendents in charge of curriculum and instruction can open the door for you at curriculum committee meetings where educational materials are discussed.

3. Principals - These people should form the core of your efforts. They know many teachers and can move the project through any red tape more quickly than anyone. If the principal is not convinced of the value your project can have in the school system, things are much more difficult. Your accomplishments will occur in spite of the principal and you expend more time and effort than you need to.

B. Working into the system with a new project(s)

1. Teachers

Within each school, there will be a few teachers willing to become involved in a project that ties in with their subject area. By following through dependably with a few teachers, word-of-mouth will probably open the door to other contacts within the school. As one teacher said to me, "Just let me know that you're not a textbook salesman".

2. Committees

Some schools and school districts have formed committees to deal with the energy situation. The energy committee formed in region three at one of the high schools contained representatives from community education the superintendent's office, the physical plant, and students from the high school. Meeting with this committee was instrumental in finding interested people at the high school to work with. A committee approach is a very effective way to involve many people in projects and complete project work.

3. Clubs and Groups
Try working with student after-school groups and parent organizations to plan events connected with your project.

4. Students
Students are a vital resource. If students are interested and excited about a project, you have a veritable army of willing assistants to plan project activities. Meet with student council officers, ecology clubs, and honor society groups and ask them about ways to work together on promotion and activities.

III. Specific Situations

A. Project Credibility
Establishing project credibility at the beginning of a new effort is crucial. In working with 48 schools, the key word is moderation. There are going to be lapses and missed deadlines when working with a state-wide network, so don't promise anything that cannot be assured. In this particular project, the enormity of the survey task created some problems with deadlines for cooperating teachers. Make sure that if you have a project milestone with a time constraint there is sufficient notice given to all people involved.

B. Government reputation
In dealing with both public and private schools, you will find that some government supported projects have a poor reputation. Some common observations were:

1) Too short term - we just get going and the government pulls the rug out from underneath our feet.
2) Irrelevant goals and objectives - how can the government know what we need in the school? They are not in the education profession. So how could a government project be designed to meet the psychological and intellectual needs of the students?
3) Too much paperwork - my students have taken four surveys this week
4) No communication - policy makers and grant developers are inaccessable.

A special word of caution when working with private schools - there has been a lot of friction over the question of state and federal assistance to private schools. So, as a result, many administrators in private school setting are wary of any federal project, no matter how substantial it may seem.

You can use these feelings however, and fashion them into an advantage for your project. By informing your potential audience about the project in a competent, confident manner and following through with materials and support. The project will raise itself above the criticism leveled at past government projects and be enhanced by your efforts.

C. Assemblies - Pro and Con

Assemblies are a sure-fire way to reach large numbers of students with information and ideas. In working with all types of schools in both rural and urban areas, it was found that large urban high schools do not readily schedule assembly programs. Discipline can be a problem in a large group and it then becomes a question whether or not an assembly is a valuable educational tool. In smaller schools, with an enrollment of 500-1200 students, assemblies can be an exciting compliment to in-class programming.

D. Whitehall High School - an energy conservation class

During the course of the Youth Energy Project, a school in Region 3 became very enthusiastic about giving their students an experience in energy education. Working with teachers and administration, a tentative lesson plan was worked out for the 1978-1979 school year. Support materials from the Youth Energy Project and a teacher workshop training session set the stage for the class.

Twelve students enrolled and as the class evolved, it became a project oriented experience. The students selected a project and reported back to the class on their efforts. As a result of these projects, the students completed:

1) one solar hot water roof heater
2) one solar oven
3) a complete lighting and energy use survey of both the high school and middle school presented to the school board
4) a solar window heater constructed from recycled materials
5) home and transportation energy audits.

These students completed a pre and post test to measure their energy conservation ethic and it was found that these students made a significant change in their attitudes. The class was termed a success and the class has been rescheduled for one more year.

E. Materials and Support Systems

Support is the key word in a pilot effort. This establishes credibility. In the Youth Energy Project, teachers were provided with quality materials and follow-up newsletters. One technique that worked well for Region 3 was to periodically send along a newly released paper on energy or a practical manual on energy conservation. The teachers appreciated the materials and it maintained contact with the schools in a three-county area, saving lots of gasoline and energy.

APPENDIX G

Letter dated 8/23/79 from Dr. W. Stevens to
Dr. Lowell Rothert regarding Phase II
Evaluation Questions

Answers to Lowell Rothert's Phase II Evaluation Questions

1. Was the teacher consultant strategy more effective than no program in raising the energy conservation etnic in youth? Yes. Teachers consulted by C.E.S. staff taught energy conservation more frequently than did control group teachers. Student attitudes in the classes of consulted teachers were not significantly higher than control teachers. However, inconsistencies in the control school student data as well as the strong correlation between teaching and YES scores imply that the consultation strategy is effective increasing student attitudes.

2. Was the teacher workshop or the teacher consultant strategy more effective in raising the energy conservation ethic? Student energy conservation attitudes and especially actions were significantly higher in the workshop groups than in the consultation group. This is most likely explained by the fact that consultation teachers conduct fewer class sessions (4.34) than do workshop teachers (5.20).

3. Which teacher workshop model (Task or Non-Task) was most effective in raising the energy conservation etnic? The "Task-Oriented" workshop model. Teachers participating in this model had students with higher YES scores and more conservation tasks completed.

   This is probably a result of the fact that almost twice as many teachers in the T-O group gave assignments to actually try to save energy in the home or in transportation (17% vs. 9%). Data from our national sample indicates that such assignments significantly improve student conservation attitudes.

4. Which model of followings in Region I (SMTC Newsletter vs no Newsletter) was most effective in raising the energy conservation etnic? Analysis not completed.

5. What was the effectiveness of changes in the energy conservation ethic in each of the five regions? Analysis not completed.

6. Were 2 day extensive workshops or one day, 5 hour teacher workshops more effective in changing the energy conservation ethic in youth? This question is impossible to conclusively answer because of major selection, history, staff and materials differences between the two workshop models.

   However, it would seem from the effectiveness of the 5 hour workshop that the 2 day workshop cannot compete on a cost-effectiveness basis. The 2 day format could potentially be cost-effective in a training of trainers design as originally proposed by MSTC.

7. Which workshops (2 day intensive or 5 hour) reached more students per teacher and had more energy student contact hours per teacher? same as 6.

8. Which are the most important variables which appear to be related to making changes in the energy conservation ethic? All of the following are based on a sample of over 23,000 students selected from our 8 state survey.

8(a) Demographic Characteristics Affect Student Attitudes toward energy conservation (total Y.E.S. score) according in the order shown below:

CHARACTERISTIC	RELATIONSHIP TO Y.E.S. SCORE
1. Grade point average	(Higher grade average scores higher)
2. Sex	(Females score higher)
3. Car ownership	(Non car owners score higher)
4. Type of largest family car	(Sub-compacts score higher)
5. Number of family car	(Fewer cars score higher)
6. Number of family members	(More members score higher)
7. Grade in school	(Higher grades score higher)

It is important to note that grade point average accounts for more variance in Y.E.S. scores than all the other variables above combined.

8(b) Relationship of attitudes to amount or type of instruction provided.

1. Number of hours of instruction	(More hours yield higher YES)
2. Receiving an assignment to actually save energy at home or in transportation	(Those receiving assignment, score higher on YES)
3. Number of different courses that include energy conservation	(More courses score higher on the YES)

(The above three factors explain approximately equal portions of the YES scores).

Point 2 above lends further explanation and support to the success of the "task-oriented" approach which includes both assignments to save energy as well as monitoring and reinforcement through meter readings.

8(c) Relationship of Geographic and Socioeconomic variables to energy conservation scores.

1. School size*	Schools which serve larger communities score higher on YES
2. Urban vs rural	Correlated with the above finding higher population density areas tend to score higher on YES
3. 4-H Membership*	4-H members score slightly higher on YES
4. Expenditures per pupil*	Schools that spend more instructional dollars per student have higher YES averages
5. Annual heating degree days*	Students in colder climates schore higher on YES

* based on Michigan students exclusively

9. What hard evidence do we have that energy consumption was reduced in the home or transportation as a result of the Youth Energy Project? Based on a sample of 80 student households it was shown that family electricity usage savings correlates signficantly with the Y.E.S scores for 4 months after the Y.E.S. is administrated. That is, increases in Y.E.S. scores (documented in the previous questions) yields predictable savings in electrical consumption.

Therefore I believe we can reliably conclude (based on our increases in Y.E.S. scores brougnt about by the EES Youth Program) that the Youth Energy Project reduced energy consumption.

10. Were significant gains made on the energy conservation ethic by elementary students? Analysis not complete.

11. Were significant gains made on the energy conservation ethic by middle school students? Analysis not complete.

12. Which models (Regions) indicated success or failure in changing the energy conservation etnic? Analysis not complete.

13. Briefly describe the negative impact of the Energy Today and Tomorrow Program. The Energy Today and Tomorrow had a negative impact on both energy conservation attitudes (lowered by 3 percentiles) and actions (on 11 grade male car owners).

14. Briefly describe the evaluation of the MSU Theater Assembly program. The MSU Theater Assembly program was evaluated by comparing the students who attended the Hart School programs versus those students who were absent due to sickness or a field trip.

Attenders score no better than did non-attenders on the Y.E.S.

15. Which teaching strategies (methods) appeared to be the most successful? Behavior management strategies embodied in the "task-oriented" approach tested in Phase I and Phase II of the EES Youth Project.

16. Which materials appeared to be the most effective teaching tools? Analyses not complete.