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SUMMARY REPORT

THE SUMMER RESEARCH APPRENTICESHIP PROGRAM (SRAP) FOR MINORITY JUNIOR HIGH SCHOOL STUDENTS

A Six-Week Summer Demonstration Enrichment Program

Woody Carter

Issued by:
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THE SUMMER RESEARCH APPRENTICESHIP PROGRAM (SRAP)

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* * *

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A documentary film entitled "Summer Research Apprenticeship Program: A Work in Progress" has been produced through the facilities of the University of California, Berkeley, Educational Television Office, with funds from the Department of Energy and Lawrence Berkeley Laboratory's Office of Equal Opportunity. The film was directed by Tom Hutcheson. It is available for rental, upon request, by writing:

Woody Carter, SRAP Film
Office of Equal Opportunity
Lawrence Berkeley Laboratory
Building 931, Room 430
1 Cyclotron Road
Berkeley, California 94720

STUDENT VIEWS OF THE SUMMER RESEARCH APPRENTICESHIP PROGRAM

The relationship between the invention of a machine
and new energy sources is a chicken and egg affair.

A "folksie" thought by Maurice Lewis

WHAT'S ENERGY?--A LIMERICK

Energy is power.
It can also be sour.
We use it like its
Going out of style.
Save it awhile.

We need Energy to
Stay in school,
Get to class,
Try to pass.
Don't be slow.
Get up and go!

Yvette Green

ENERGY

People say energy is on the line,
But they keep misusing it all the time.

With no thought of what the future has in store,
They let energy just blow right out the door.

America needs more people to conserve
And if they would
America could
Serve up energy like it should.

Stephanie Scott

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INTRODUCTION

This report summarizes the development and implementation of the 1980 Summer Research Apprenticeship Program (SRAP) for minority junior high school students conducted by the Lawrence Berkeley Laboratory Office of Equal Opportunity. This six-week pilot program, funded by the U.S. Department of Energy, was designed to stimulate a broader interest in scientific, engineering, and other technical careers among minority students.

Although the summer program emphasized an academic enrichment curriculum, the anticipated academic year follow-up will concentrate on providing career education activities, field trips to local industrial sites, and guest speakers, such as research scientists from the Lawrence Berkeley Laboratory (LBL).

The summer program provided "hands on" activities in the laboratory, instruction in mathematics, development of scientific communication skills, computer science techniques, and exposure to researchers at work. The SRAP, housed on the University of California, Berkeley (UCB) campus, also provided field trips to local science and energy-related exhibits, group counseling, and films.

PURPOSE

The goal of this six-week program was establishment of a demonstration academic enrichment experience for minority junior high school students. To accomplish this purpose, the program provided participants with the following educational opportunities:

- A six-week research exposure for 25 minority students who had completed the 7th or 8th grade and were in the 6th and 7th stanine groupings.
- Group counseling and enrichment in science, math, communication skills, and computer science.
- Work on science research projects individually or in small groups under supervision of an instructional staff.
- Follow-up sessions during the 1980-1981 academic year providing motivational activities and field trips.

The major objectives of the SRAP were:

1. Development and enrichment of students' mathematics, science, and communication skills.
2. Student interaction with potential role models, LBL scientific staff, program instructors, and UCB minority students.
3. Student exposure to a broad spectrum of research in the basic and applied sciences and engineering at LBL.

4. Student association with other students who are highly motivated to attend college.

PLANNING PHASE

The LBL Affirmative Action Department had approximately three and one-half months to prepare to implement the SRAP program. Planning began immediately after notification that the SRAP proposal had been approved and would be funded. Planning continued from March 10 to June 20, about three days before the program actually got underway. The following schedule was used in developing plans:

March	2nd week:	Development of SRAP recruitment materials
	3rd week:	SRAP information sent to junior high schools
	4th week:	Visit to junior high schools
April	1st week:	Teacher recruitment started
	2nd week:	Teacher recruitment continued
	3rd week:	Student application deadline April 15
	4th week:	Interview student applicants at schools
May	1st week:	Final selection of student applicants
	2nd week:	Acceptance letters sent to student parents
	3rd week:	First meeting with head teachers; curriculum development
	4th week:	Parent and student orientation meeting
June	1st week:	Pre-assessment testing of students (math and English)
	2nd week:	Pre-assessment testing of students (science)
	3rd week:	First staff meeting
	4th week:	First classes scheduled June 23

Student Recruitment and Selection Process

Four junior high schools from the three major East Bay school districts were invited to recruit students to participate in the program. These schools were the Claremont and McChesney schools in Oakland, the Martin L. King school in Berkeley, and the Portola school in the Richmond School District. School selection was based upon their proximity to LBL, as well as upon their sizeable minority student populations. Work with school principals or guidance counselors brought 58 applications from 7th and 8th grade students. Five additional applications were received from UCB's Office of Relations with Schools.

Each applicant was interviewed individually. Twenty-five participants were selected and eight additional students were classified as alternates. Criteria for selection included:

- Grade-level status in reading and math, as determined by CTBS test scores, if applicable, and/or 6th, 7th, and 8th grade achievement ratings in these two subjects and in general science.

- Response to interview questions that assessed an applicant's interest in science, the SRAP, and his or her desire to enter college.

- Selecting a diversified group of participants insofar as sex and ethnic background were concerned.

- Willingness of the applicant to commit himself to attend the full six-week program and to participate in the academic year phase of the project.

Table 1 is a summary of the recruitment and selection process. The summary indicates the numerical and percentage composition of applicants and selectees by school, sex, and ethnic background.

Teacher Recruitment, Screening, and Selection

Head Teachers. A total of 25 applications were received for head teachers positions in science, math, English, and computer science. These applications were screened initially by considering appropriate academic background and relevant teacher experience. Qualified candidates selected by this screening process were interviewed and rated according to the extent of each individual's experience in working with minority pre-college students, utilizing the "hands on" participatory teaching technique, and working with small groups or with individual students. As a result of this extensive screening and interview procedure, the following were selected as head teachers: Science, Deborah Shenfil; Math, Ruth Willis; Communications Skills, Daphne Muse; Computer Science, Emile Carter; and Group Counseling, Woody Carter. Resume biographies are provided in Appendix A.

Assistant Teachers. Approximately 16 applications were received for the SRAP teacher positions in the four academic programs and for an instructor for the recreation program. Because the general qualifications and the wage scale for the latter position were commensurate with those of the assistant teacher positions, the position was grouped in this category.

Assistant teacher positions were open to UCB undergraduate students. Most of the applicants were recommended by the UCB Professional Development Program (PDP), an academic enrichment program aiding minority high school students preparing to enter the university. Referrals were former PDP students who also had prior assistant teaching or tutorial experience working in the PDP. Using these individuals as assistant teachers provided SRAP junior high school students with an opportunity to interact with other minority students currently attending UCB. These assistant teachers also provided role models who could identify with the concerns and academic issues of SRAP minority students. The assistant teachers selected were: Science, George Barnes, Jr.; Communication Skills and Group Counseling, Patricia Stewart; and Recreation Program, John Laetsch. Summary biographies are in Appendix A.

Table 1. Recruitment and Selection Summary

Applicant Analysis

Applications by School	Number	Percent	Ethnic Background	Number	Percent
Claremont	20	32	Asian	10	15
McChesney	8	13	Black	47	75
Martin L. King	14	22	Hispanic	6	10
Portola	16	25	N. American	0	0
Partnership Program	5	8			
Total	63	100		63	100

Approximate Number Placements Allocated to Each School

School	Number	Percent
Claremont	8	32
McChesney	3	12
Martin L. King	6	24
Portola	6	24
Partnership Program	2	8
Total	25	100

Selectee Characteristics

	Sex		Ethnic Background			School Grade		
	Number	Percent		Number	Percent		Number	Percent
Male	13	52	Asian	3	12	Grade 7	8	32
Female	12	48	Black	19	76	Grade 8	17	68
			Hispanic	3	12			
			N. American	0	0			

The Advisory Committee

A SRAP Advisory Committee was established with members selected from LBL researchers and technicians and from representatives of other UCB educational enrichment programs. Committee members participated in interviewing candidates for head teacher positions, commented on curriculum content, and conducted tours for SRAP students visiting LBL research projects and facilities. Committee members were:

Juan De Olivares	Mechanical Engineer
Karl Johnson	Physicist
Greg Jones	Mechanical Engineer
Julia Quint	Biochemist
Greg Raymond	Civil Engineer
Pio Winston	MESA Program Coordinator, UCB
Uri Triesman	Professional Development Program, UCB

Planning Phase Recommendations

The following recommendations have been developed as a result of the experience gained in planning for the 1980 SRAP program. Adoption of these recommendations will assure effective management of the 1981 program.

- Planning period. A three-month planning period is too short a time to prepare the program. At least six months are needed for developing plans, selecting students, and recruiting the instructional staff. Additional time would foster more effective integration of core-subject curricula and would also improve the development of a science laboratory program offering a broader, multi-disciplinary approach to the "hands on" participatory technique so important to the SRAP program. Increased planning time would provide greater assurance that equipment, course materials, and supplies would be delivered prior to the start of classes.

- Student Recruitment. SRAP needs to broaden its network of public school teachers, counselors, and administrative staff members who could take a more positive and more active part in recruiting minority students for the program. Increasing the number of school staff members participating would develop a more diversified pool of applicants in terms of ethnic backgrounds. The program needs to attract more Hispanic students, and a recruitment program for Native American youths must be developed.

- Screening and Selection Process. The screening and selection program must be reviewed to provide more accurate means of assessing a student's genuine interest in science and mathematics and his motivation in participating in SRAP. A one or two page essay, for example, might be an effective means of assessing student interest in science as well as determining whether or not the individual is fully motivated.

- Recruitment of the Instructional Staff. A means must be developed to attract a greater number of qualified applicants for head teacher positions. It is possible that a recruitment "outreach" program might reach more minority applicants who are qualified for head teacher positions.

- Advisory Committee. The SRAP Advisory Committee played an important part in the success of the 1980 program. Their functions should be continued and expanded. Committee members--and other LBL research scientists and staff members--should be encouraged to participate actively in all SRAP activities.

THE SRAP PROGRAM

PROGRAM SUMMARY

The Summer Research Apprenticeship Program (SRAP) was conducted from June 23 through July 31, 1980, a total of six weeks. Classes were held from 9:00 a.m. to 3:00 p.m., Monday through Tuesday, and from 9:00 a.m. to 12:00 noon on Friday. Staff meetings were scheduled for Friday afternoon. Students were provided with transportation costs, lunches, books, and supplies.

Twenty-five students from four area junior high schools participated in the program (See Planning Phase for student selection criteria). The class was divided into two groups, Group A and Group B, with either 12 or 13 students in each group. Composition of the groups remained unchanged during the entire program.

Four academic courses were scheduled: communication skills, computer science, mathematics, and science. Curriculum centered about energy and energy-related technologies. Table 2 is a weekly schedule for the SRAP program. Summary reports of each course are in Appendix B. This appendix also includes a list of materials used by the various courses.

In addition to the four academic courses, group counseling sessions were held each week. This provided students with an opportunity to discuss the program with members of the instructional staff and to participate in other counseling activities. Field trips or a film program were a part of each week's schedule. A recreational program provided students with swimming or various other athletic activities each Friday. These extra-curricular programs are discussed in Appendix C.

STUDENT ASSESSMENT EXAMINATIONS

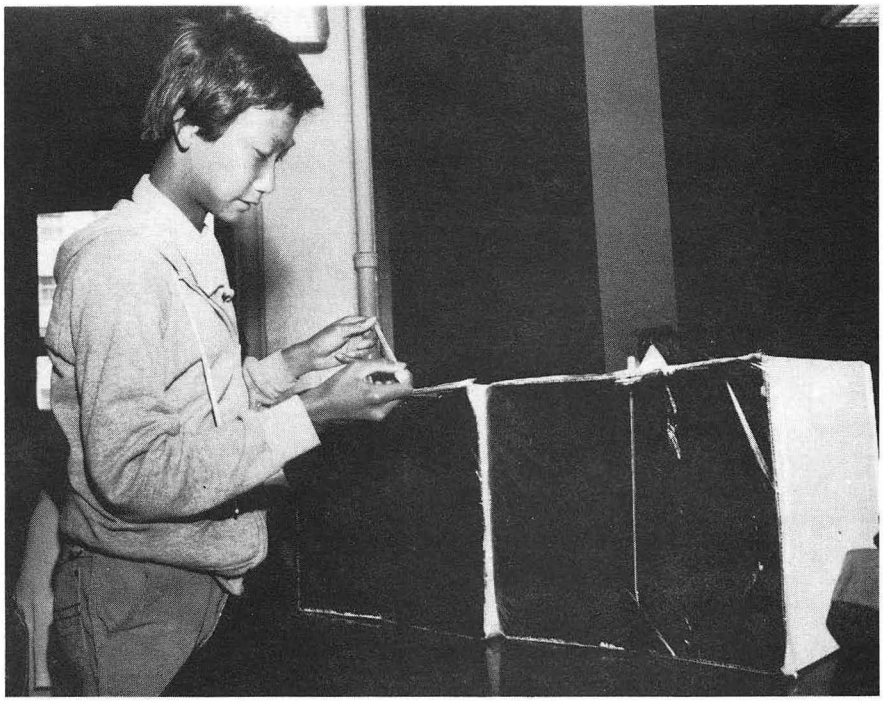
Each student was given a pre-assessment test in math, communications skills, and science prior to the beginning of the SRAP program and a post-assessment test during the final week of instruction. Test results were evaluated to determine the student's achievement in each subject and to identify areas of weakness which merited remedial action.

Tests were prepared by the head teacher of each course. The pre-assessment evaluation was instrumental in finalizing the curriculum for the entire program. To provide an objective evaluation of the student, the same test was used for both pre- and post-assessment testing of students in math and science. Although the content of the communications skills examination was changed for the post-assessment test, the same academic skills were tested. Maximum time allocated for completing each test was one hour. Appendix D contains copies of the examinations for each of the three academic courses.

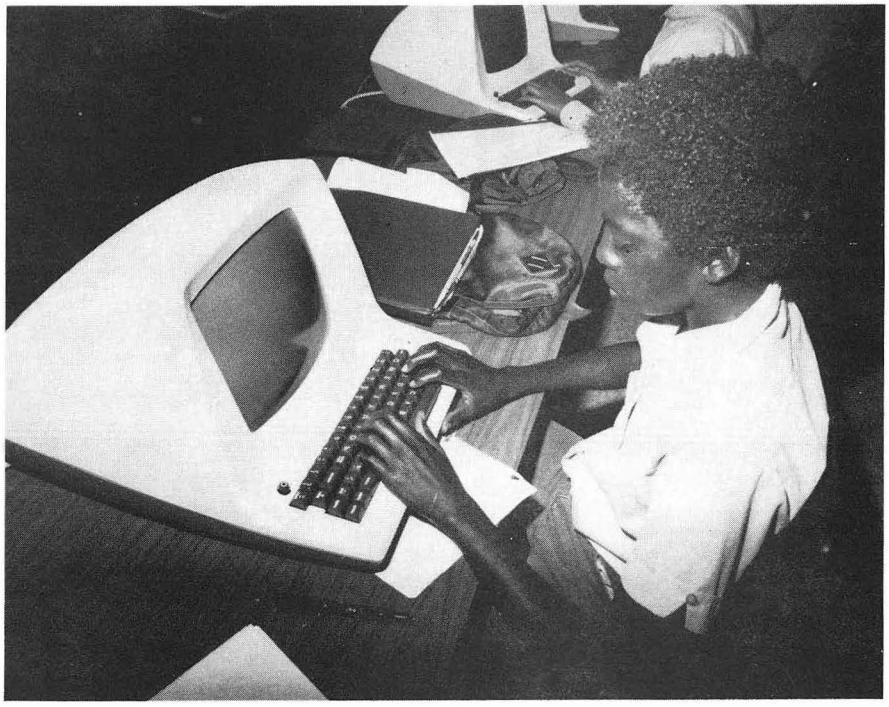
Table 2. Summary Research Apprenticeship Program Weekly Schedule

	Mon.	Tues.	Wed.	Thurs.	Fri.
9:15-10:00	A. Math B. Engl.	A. Engl. B. Math	A. Computer Class B. Engl.	A. Math B. Engl.	A. Engl. B. Math
10:10-10:55	A. Engl. (SGS) B. Math (SGS)	A. Math (SGS) B. Engl. (SGS)	A. Engl. B. Computer Class	A. Engl. (SGS) B. Math (SGS)	A. Math (SGS) B. Engl. (SGS)
11:05-11:50	A & B Swimming/Gym	A. Group Counseling B. Computer Science	A & B Swimming/Gym	A. Computer Science B. Group Counseling	A & B Swimming/Gym
12:00-1:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00-3:00	Science Lab	Science Lab	Science Lab	Field Trips Workshops Films	Staff Meetings (No Class)

(SGS) = Small Group Study



SRAP student working on solar energy project.



Student at computer terminal.

A comparison of percentile scores in math, science, and communication skills is shown in Figures 1-3. The test results indicate that:

1. A comparison of the pre- and post-assessment scores show that 80 percent of the students increased their proficiency in math and 72 percent in science.

2. Although the communications skills test scores suggest that academic progress was achieved, it is questionable whether or not the test accurately evaluated each student's pre- and post-test performance. The communication skills test focused on essay response and the evalution had to be based upon grammatical usage, syntax, and quality of content.

3. Forty percent of the students excelled on or above the 75th percentile in the math post-assessment test, compared to only four percent at this level in the pre-testing. In science, 36 percent were on or above the 75th percentile level in the post-assessment evaluation, compared to 16 percent in the pre-testing. Comparison of the test scores in communications skills indicates that 76 percent of the students scored 75 percent or higher on both the pre- and post-assessment tests.

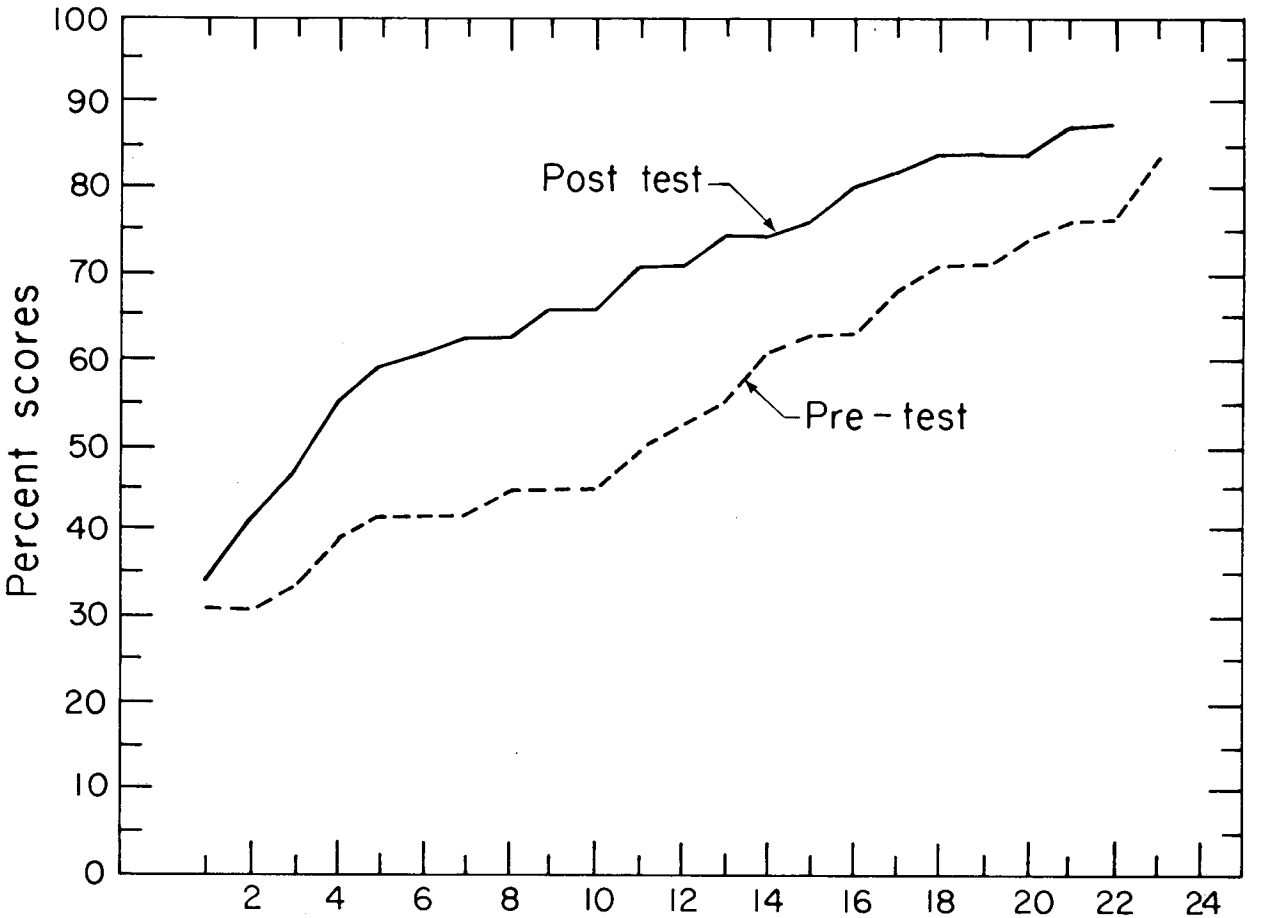
4. Several students showed outstanding improvement. For example, one student moved from the 13th percentile in the pre-test to the 94th percentile in the post-test in math; another student improved from the 42nd percentile in science pre-testing to the 80th percentile in the final evaluation.

SRAP staff members are analyzing both the aggregate assessment graphs and pre- and post-assessment graphs reflecting each student's individual performance. These studies will assist in:

1. Identifying some of the general characteristics of students whose pre- and post-test scores do not appear to indicate a relative degree of academic improvement when compared to other students in the class.

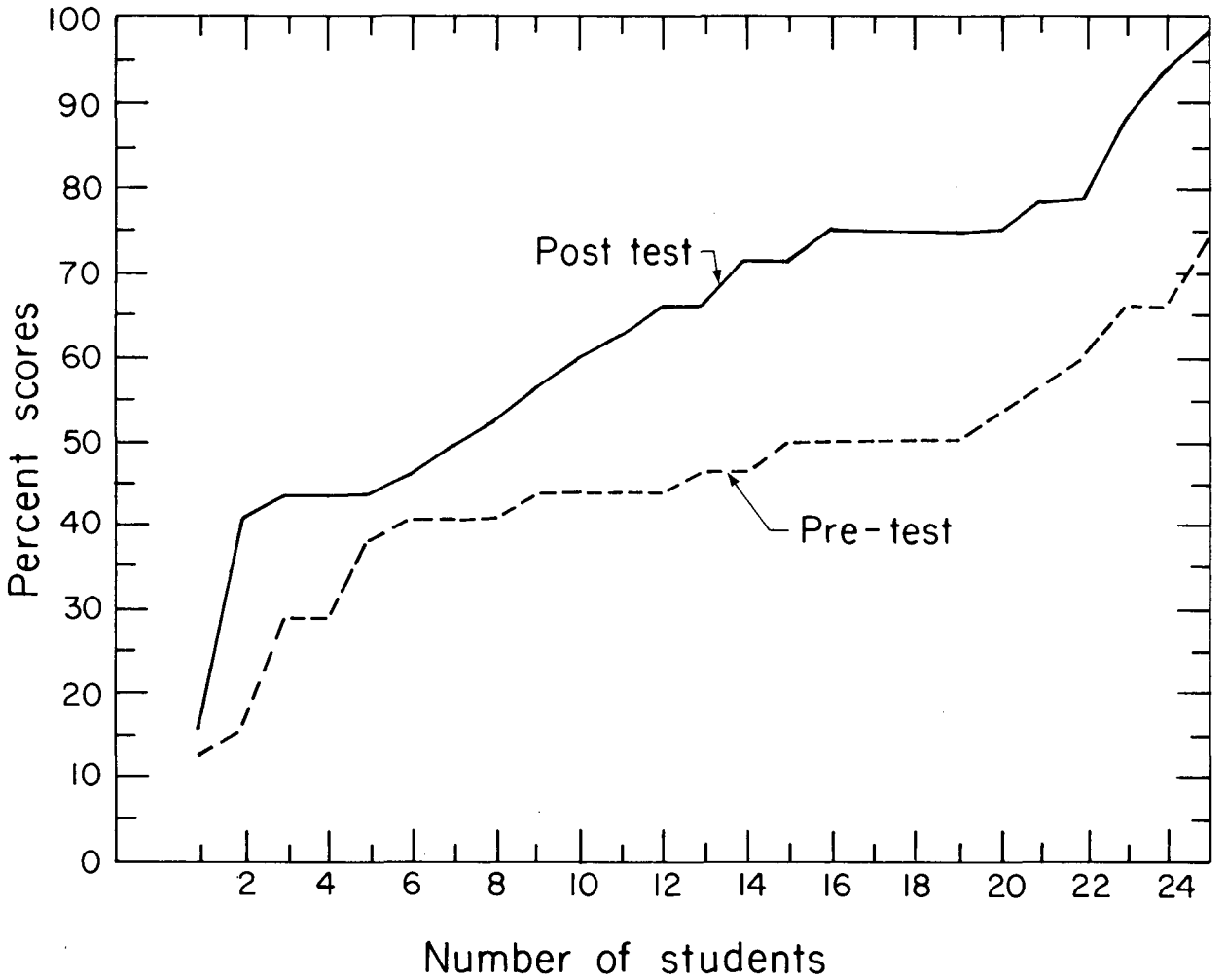
2. Refining the criteria for selecting future SRAP participants.

3. Refining the curriculum for each course to more accurately meet the academic needs indicated by test results from the assessment evaluations.



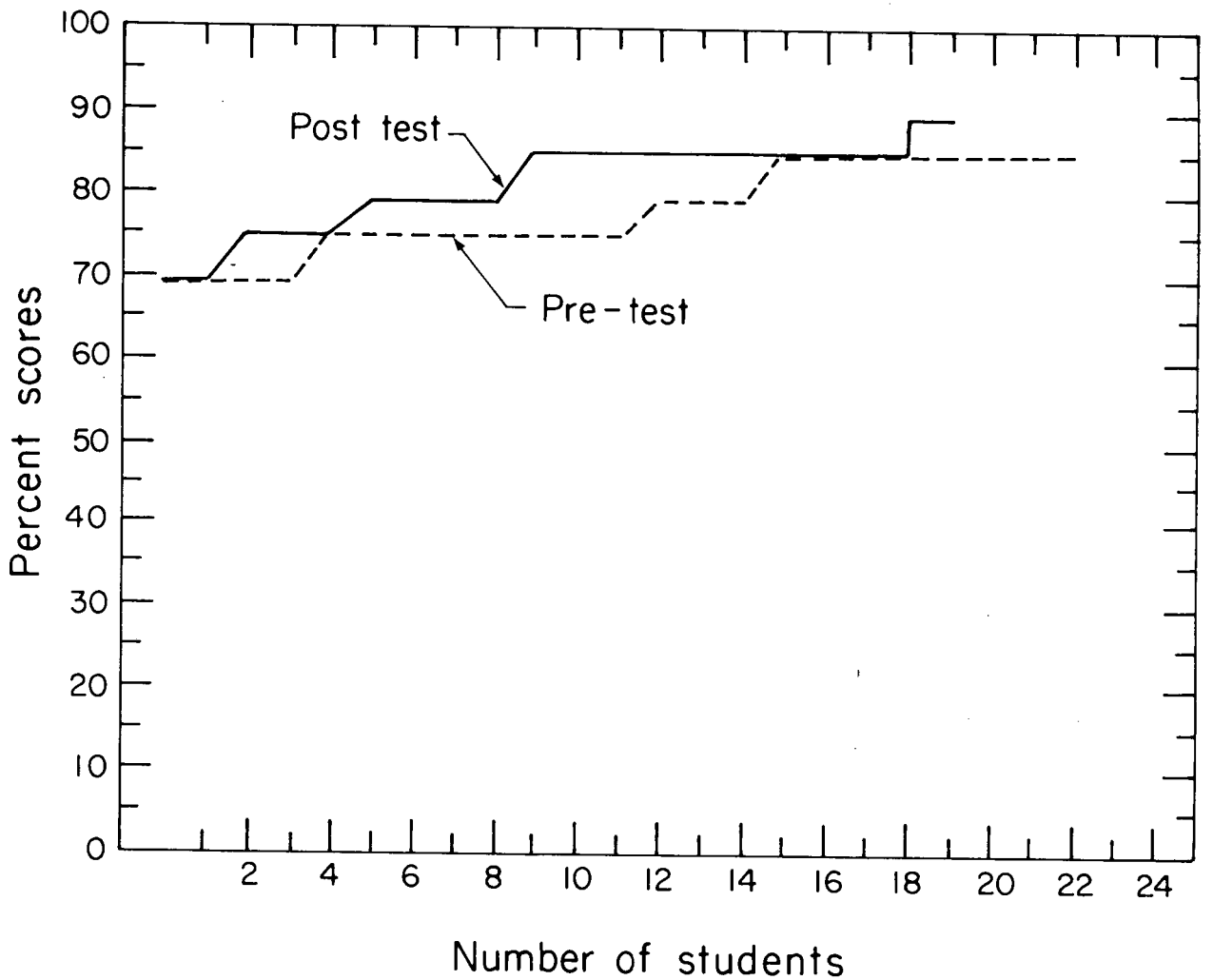
XBL8010-2272

Figure 1. Science pre- and post-assessment aggregate test scores.



XBL 8010-2273

Figure 2. Mathematics pre- and post-assessment aggregate test scores.



XBL8010-2274

Figure 3. Communications skills pre- and post-assessment aggregate test scores.

Working on an individual science project.

Students constructing windmill model.

In the 1981 SRAP program, a standard assessment examination, such as the California Test of Basic Skills (CTBS), will be used before and after the program to evaluate student progress in the core subjects. Using a standard examination of this type will also enable the SRAP staff to more accurately follow the academic improvement of participating students, especially those students attending two consecutive summer sessions.

STUDENT AND TEACHER SRAP PROGRAM EVALUATION

Each student, teacher, and staff member was required to evaluate the overall effectiveness of the SRAP. Only 24 students assessments were received. Copies of the student and teacher evaluation forms are in Appendix E.

Student Program Assessment

Following is a summary of student response to assessment questions:

1. Academic emphasis: Was the importance of academic improvement and excellence sufficiently stressed? Overly stressed?

Sufficiently stressed	12
Overly stressed	2
Mixed responses	2
Undecided	8

Comments on mixed responses above included: math stressed sufficiently, English overly stressed, and science not properly stressed.

2a. Curriculum: Did you find the courses offered appropriate?

Yes	20
No	4

2b. Did the courses meet your needs?

Courses met needs	17
Courses did not meet needs	3
Mixed responses	2
Undecided	2

Comments on mixed responses included: math and English did meet needs; science had too much energy.

3. Activities (field trips, films, yoga)

a. Were there enough activities?

Yes	18
No	6

b. Which activities did you like the most?

Field trips	14
Yoga	5
Sports	4
Undecided	1

c. Which activities did you like the least?

Films	10
Yoga	12
Urban House field trip	2

d. What activities should be considered next year? Responses included the following comments:

Anything not dealing with energy
More field trips
More computer science
Better films
Lengthen the program

4. General:

a. Would you recommend this program to another student like yourself?

Yes	24
No	0

b. Would you be interested in coming to the program next summer?

Yes	22
No	2

5. Academic year program

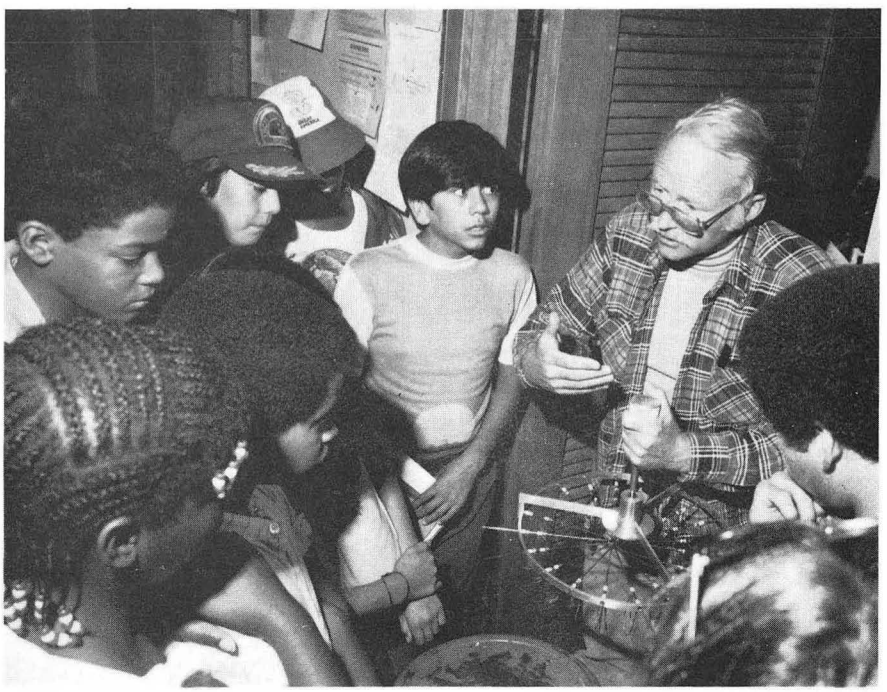
a. Would you be interested in attending?

Yes	18
No	2
Undecided	4

b. What kinds of activities would appeal to you the most?

	Yes	No
Tutoring in your school	10	4
Field Trips	13	1
Yoga	3	11

"Hands on" participation during the Exploratorium Field Trip.



Dr. Ridgway Banks explains his nitinol engine.

Teacher Program Assessment

Members of the SRAP staff participated in one full-day and two half-day program assessment sessions in addition to completing assessment questionnaires. Approximately eleven hours were devoted to the review of the summer program to identify major problem areas and issues in relation to the project's stated goals and objectives. Instructors also recommended program modifications or corrective actions based on student performance. James Coleman and Ryon Huffman of the LBL Employee Development and Training Section acted as facilitators for these assessment workshops. Following is a summary of staff concerns and recommendations for the 1981 SRAP:

Planning Phase. More time is needed in planning the summer program to (1) recruit, screen and select the staff at an earlier date; (2) arrange staff workshops for curriculum development and integration of course materials; (3) provide for staff orientation sessions focusing on procedural administrative policy issues; (4) arrange for better program physical facilities and provide for access to UCB libraries and other resources; and (5) arrange for program materials to be ordered and delivered prior to the start of the class program.

Student Selection. Refine student recruitment and selection processes to more accurately assess student potential and student motivation for participating in the program. Selection criteria should also compensate for the wide ranges of interest and abilities of the selectees.

The group recommended that former SRAP and the Professional Development Program (PDP) participants be used to assist in student recruiting; that recruiting be improved by expanding the network of contacts with junior high school staff members; and that the selection guidelines be re-evaluated. It was the consensus of the staff members that the SRAP class should be expanded to include 30 students instead of the 25 who participated in the 1980 program. It is anticipated that 20 of the 1980 group will return for the 1981 program. A full-time summer coordinator was felt to be necessary to oversee the full program, including recruiting.

General Course Comments

The staff indicated that more recreational activities and field trips should be scheduled to encourage interaction outside the classroom between students and teachers. Consideration should also be given to initiating joint activities with other UCB summer education enrichment programs. Qualified students should be recommended to other academic enrichment programs which pertain to high school students preparing for college. Consideration should be given to establishing a summer program student disciplinary council to recommend corrective action for students who misbehave. The staff program-assessment workshops should be expanded to a total of three full-day sessions following the summer program. Weekly staff meetings should be held on Wednesday instead of Friday. A weekly newsletter should be established to provide current information concerning the SRAP staff, student activities, and other related matters. Consideration should be given to obtaining an outside evaluation team to assess the SRAP summer program. Each teacher should evaluate each student based upon that

student's assessment test scores and performance in class; these evaluations should be sent to students, their parents, and to participating schools.

Course Content. There were many comments concerning the SRAP curriculum, various courses, and general course activities. The instructors indicated that greater emphasis on academic rigor and excellence was needed. Planning for the Open House should be started earlier in the summer. Students should have more contact with LBL scientists and technicians; students should also be exposed to more research activity at the laboratory. The instructors recommended that SRAP continue to seek ways of encouraging students to gain greater self-image awareness. Group counseling and similar activities should continue to be stressed. This seems important for this age group (12 to 15) whose general social and emotional characteristics suggest a degree of inner turmoil. Robert F. Biehler,* Professor of Educational Psychology at Chico State College, California, supports this view in discussing the social and emotional factors that characterize the adolescent in this manner:

"a. Their physical and mental endurance is limited at this point;
b. The peer group becomes the source of general rules of behavior; there is generally a conflict between the peer code and the adult code;
c. At this age, a student is likely to be moody and unpredictable, partly as a result of biological changes associated with sexual maturation and partly due to his own confusion about whether he/she is a child or an adult; and
d. Students may behave boisterously to conceal lack of self-confidence."

These characteristics were reflected in the SRAP students "acting-out" behavior which, at times, inhibited the learning process. It is interesting to note that in so-called primitive cultures, a formal passage from childhood to adulthood--the rite of passage--was an integral part of the educational process. This concern seems to be coincidental to our educational system and, if dealt with at all, is generally perceived to be a function of family relationships and peer group interaction. The question of whether or not self-awareness issues can be dealt with in a relatively traditional educational setting and integrated into an academic curriculum may be a new frontier for pedagogical inquiry. It may also suggest a theme or focal point for development of SRAP extramural activities.

Academic Courses. Specific comments and recommendations were made concerning the four academic courses of the SRAP program. The instructor discussions indicated that the length of lab time in the science course should be shortened to ninety minutes instead of two hours and that more laboratory periods should be scheduled each week. Classes should be smaller with no more than 12 students in each lab period. Better lab management and application of research techniques in performing experiments should be instituted. Students indicated a belief that too much

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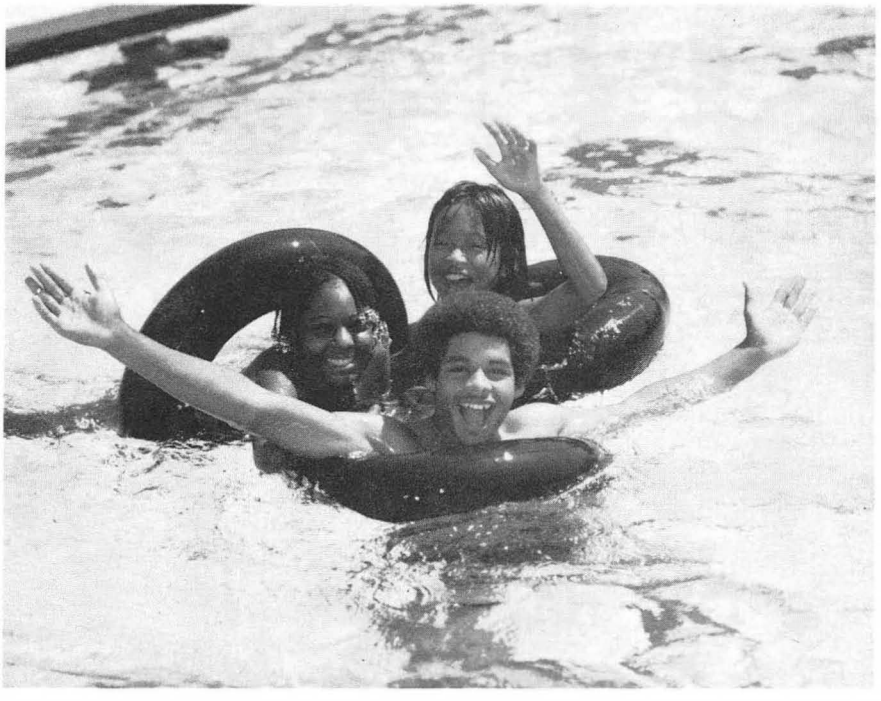
*Robert F. Biehler, Psychology Applied to Teaching, Houghton Mifflin Co., Boston, 1971. P. 129-130.

Sound generation demonstration at the Exploratorium.



Swimming in the Harmon Pool, part of the recreational program.

emphasis was placed upon energy-related issues in the 1980 science course. Consideration should be given to providing science electives including physics, astronomy, chemistry, oceanography, and biology.

In contrast to recommending shorter science lab periods, the instructors recommended that math class periods be increased from 50 to 60 minutes and that math be scheduled every day. The head math instructor indicated that the National Science Teachers Association Mathematics in Energy, Grades 8-9 (August 1979) was not appropriate for SRAP students. In her opinion, the verbal problems in this text were generally obtuse and open to multiple answers. She suggested using Stein's Mathematics in a Man-Made Universe for the 1981 SRAP math course.

It was also recommended that communications skills class periods be increased from 50 to 60 minutes. In addition to stressing continued development of writing skills relating to research documentation, emphasis should also be directed to expository and creative writing. Consideration should be given to including reviews of science fiction literature and readings which relate to minority contributions to science and mathematics.

Because of seeming disinterest by some of the 1980 SRAP students, it was recommended that consideration be given to offering the computer science course as an elective. This would screen out students who were genuinely not interested in the subject. The instructors again recommended an increase in time allocated, suggesting that the computer science sessions be 60 minutes long and that they be scheduled every day. An assistant teacher was also believed necessary for this course in order to provide better attention to and assistance in solving individual student problems.

ACADEMIC YEAR SUPPLEMENTARY SRAP PROGRAM

To supplement the educational benefits gained from the summer SRAP program, a supplementary course is being offered to participating students. This program will begin in November 1980 and continue through May 1981. The schedule calls for a one-day session each month and includes various workshops and discussions relating to a variety of scientific and technical topics. The following is a detailed outline of the 1980-81 program:

SUMMER RESEARCH APPRENTICESHIP PROGRAM

Saturday Program Series

The SRAP academic year program will meet one Saturday each month beginning in November through May. Each Saturday you will have the opportunity to participate in both workshop sessions.

Workshop #1:	9:45 a.m. - 10:45 a.m.
Workshop #2:	11:00 a.m. - 12:00 noon
Special Events:	12:45 - 1:15 p.m. (to be announced)

November 1

Workshop #1 - Microscopic Monsters - Transform a drop of water into a teeming jungle. You will learn to use microscopes to enlarge organisms 10 to 900 times. Discover their bizarre structure and movements. Daphnia, paramecium, rotifers, hydra, blood moving, through a fish's tail and plant cells are some things you'll examine as you make slides and drawings.

Workshop #2 - Light, Lenses and Telescopes - See how light is bent by lenses. Then find out how to use lenses to make either a telescope for starwatching or a microscope for bug watching.

December 6

Workshop #1 - Chemical Detective - Become a chemical detective. Pour and mix chemicals together to discover which elements you are using. Explore the telltale colors of the various solutions as they flare up for more clues to their real identities.

Workshop #2 - What are stars made of? - See how light can be broken up into many colors. Colors seen in starlight can tell us what the star is made of. Colors seen in light from a planet can tell us what's in the planet's atmosphere; could we breathe it or would it poison us?

January 10

Workshop #1 - Animal Behavior - How far can a toad see? On what surface does a snake move fastest? Which chick is dominant? Work with many different animals to answer these and other questions. Experiment with foods, colors, substrates, lures and mirrors to test the animal's response then evaluate the group's results.

Workshop #2 - Exo-biology - What kinds of creatures might we find elsewhere in the universe? We'll start by taking a close look at Mars, speculating on what life forms could survive there. Then we'll visit the planet Omicron in a distant star system to see what lives there.

February 7

Workshop #1 - Breathe Deep - Test the physical fitness of your lungs as we measure our breath rates. Find out how much air you can really hold. Run experiments to show what gases you breathe in and breathe out.

Workshop #2 - Orbits of moons and planets - Explore planets and moons in the solar system and gauge their orbit rates. Then go farther out to see why some stars seem to blink on and off.

March 14

Workshop #1 - Keep on Pumping - Use stethescopes to hear your heart beat and a sphygomanometer (!!) to measure your blood pressure. We'll graph changes in our blood circulation to monitor our fitness.

Workshop #2 - Fuzzy Patches - Look at some of the really way out celestial objects: comets, nebulae, galaxies, neutron stars and black holes in space (can you really see them?)

April 4

Workshop #1 - Comparative Anatomy - What does a lung look like? How many muscles are in a leg? Where is the gall bladder? Find out by dissecting a specially prepared animal. Become a surgeon for the morning.

Workshop #2 - Finding the constellations - Use star maps to find your way around the stars in the sky. We even use these maps to find our direction here on earth.

May 9-10

Workshop #1 - Outdoor Survival - Learn how it would be to live off the land and feel at home in the wilderness. We leave Berkeley - West Gate - Saturday 10:00 a.m. for an overnight at Point Reyes National Seashore. We'll explore wild food plants, track animals, use compasses and learn to handle some wilderness accidents and emergencies. After a tidepool/ beach exploration we'll return to Berkeley at 5:00 p.m. on Sunday.

Workshop #2 - Star gazing/celestial navigation - Use binoculars to find interesting objects in the skies during the week-end field trip (weather permitting).

Transportation to the Lawrence Hall of Science

According to the AC Transit schedule, you may catch the bus that will take you directly to the Hall at 9:11 a.m. at the Berkeley BART, Shattuck and Center Street stop. This bus will arrive at the Hall at 9:33 a.m. Since you cannot expect the bus to wait for you, I would suggest you plan to arrive at the bus stop at 9:00 a.m.

You may catch the bus from the Hall at 12:33 p.m. which will return you to the Berkeley BART station. When a special event is scheduled, you may board the bus at 1:31 p.m. a short distance from the Hall at Grizzly Peak and Senior Avenue. (Transportation expenses to and from the Lawrence Hall of Science will be the responsibility of each participant).

SRAP BUDGET STATUS REPORT

Project Location UCB-LBL Reporting Period 6/23/80 - 8/1/80

Category	Total Budget	Amount Expended	Balance
I. Student Costs			
Travel	$ 625.00	$ 622.00	$ 3.00
Books/supplies/photos	2,500.00	1,175.00	1,325.00
Lunch	2,138.00	1,757.00	381.00
Subtotal	$ 5,263.00	3,554.00	1,709.00
II. Curriculum Development Costs			
Science	400.00	400.00	0
Math	400.00	400.00	0
English	400.00	400.00	0
Computer Science	80.00	80.00	0
Subtotal	$ 1,280.00	1,280.00	0
III. Field Trip Costs			
Fees	200.00	125.00	75.00
Films	200.00	118.00	82.00
Transportation	250.00	90.00	160.00
Subtotal	$ 650.00	333.00	317.00
IV. Insurance	100.00	0	100.00
Recreational Costs	100.00	100.00	0
Open House Program	100.00	207.00	-107.00
LBL Workshop Costs	100.00	0	100.00
Computer Time Charge	900.00	702.00	198.00
Subtotal	$ 1,300.00	1,009.00	291.00
V. Documentation Costs	5,000.00	0	5,000.00
Subtotal	$ 5,000.00	0	5,000.00
VI. Labor Costs	7,235.00	7,713.00	-478.00
Subtotal	$ 7,235.00	7,713.00	-478.00
Sub Total	$20,728.00	13,889.00	6,839.00
Academic Year Program	2,325.00	0	2,325.00
Sub Total	$ 2,325.00	0	2,325.00
Total	$23,053.00	$13,889.00	$9,164.00

SRAP BUDGET STATUS REPORT (continued)

Category	Total Budget	Amount Expended	Balance
LBL Overhead Charge (40.5%)	$ 9,336.00	5,625.00	3,711.00
GRAND TOTAL	$32,389.00	$19,514.00	$12,875.00

*Additional expenditures are anticipated in the following categories:

Documentary Film $2,308.00
Travel

APPENDIX A

TEACHER BIOGRAPHICAL SUMMARIES

TEACHER BIOGRAPHICAL SKETCHES

HEAD TEACHERS

Science Instructor: Deborah Shenfil. Bachelors degree in Biological Sciences; California teaching credential in secondary education; instructor in Alameda and Contra Costa county schools' Marine Education Program; administration and supervision of Point Molate Marine Laboratory; extensive experience in curriculum development and "hands on" participatory approach to science laboratory activities.

Math Instructor: Ruth Willis. Bachelors degree in mathematics; director of Richmond SEED Project providing in-service training for mathematics for teachers in SEED classes; Department chairwoman and instructor at Hamilton Junior High School; former math instructor for UCB Upward Bound Project. (SEED is a nationwide project in which professional mathematicians and scientists from major universities and research corporations teach abstract, conceptually oriented mathematics to full-sized classes of educationally disadvantaged elementary school children on a daily basis as a supplement to their regular arithmetic programs.)

Communications Skills Instructor: Daphne Muse. Bachelors degree in Literature from Fisk University; faculty of Mills College in Department of Ethnic Studies; teaches courses in writing and children's literature; former associate in Afro-American Studies Department, teaching composition and writing courses.

Computer Science Instructor: Emile Carter. Computer Science-Business Administration undergraduate student, UCB; math assistant and workshop leader, UCB Professional Development Program; head math teacher for UCB MESA summer program (Carter was also selected to be an assistant teacher in the SRAP math course).

Group Counseling: Woody Carter, SRAP Coordinator; member of LBL Affirmative Action Department staff; former instructor of Afro-American humanities at Contra Costa College; former caseworker for teen-age children in foster care for the New York City Department of Social Services; former academic counselor at Hostes Community College (CUNY) in New York.

ASSISTANT TEACHERS

Science: George Barnes, Jr. Graduating senior in Chemical Engineering; entering University of California Medical School fall 1980.

Communications Skills and Group Counseling: Patricia Stewart. Engineering major; math workshop leader UCB Student Learning Center; English teacher's assistant for the UCB MESA project.

Recreation Program: John Laetsch. Economics and History major; sports assistant for the UCB Recreational and Intramural sports programs.

Math: Emile Carter (see Bibliographical sketch for Communication Skills instructor above).

APPENDIX B

COURSE SUMMARIES

Computer Science Program
Mathematics Program
Science Program
Communication Skills Program
Course Materials

COMPUTER SCIENCE PROGRAM

Course Outline

Each class received three hours of computer science instruction or practice each week. Time was divided between work at computer terminals and lecture-demonstration periods. Major emphasis, however, was placed on computer lab work.

Program Goals. Overall goals of the computer science program were:

- Introduction to the basic concepts of computer programming in an environment from which many of the irritating details of programming had been removed.
- Provide practice in organizing problem-solving techniques, specifically top-down decomposition and pattern recognition.

Program Organization. The computer science program was organized as follows:

Week I. Introduction to the Unix time-sharing system and the editor.

Week II. Introduction to the Robot Programming System (Karel).

Week III. Top-down programming.

Week IV. Testing conditions within the program.

Week V. Repeating sections of a program.

Week VI. Various subjects:

A. Advanced robot programming
B. Real programming languages such as Basic or Pascal
C. Word processing tools such as roff
D. Computer games

The material covered in Week VI was determined by student interest. However, some algebra-related topics were to be discussed to provide students with practice with inductive proofs. The discussion of programs written in Basic or Pascal exposed students to a less restricted and more "real" programming environment and gave them a feel for constructions normally used in any programming language. Use of word processing tools introduced students to practical non-numeric uses of computers. Games were intended primarily as fun but also had the purpose of motivating students to write games of their own design.

Course Summary and Comments

More terminals were required for it became apparent after the first two or three sessions that the number available did not provide sufficient "hands on" capability for the class. Beginning with the very first day, students showed much interest which was evidenced by the many questions asked. This interest was also indicated by students coming to class early

in order to start the day's work and by a number who came to the computer lab after the day's classwork had been completed. Generally, students seemed enthusiastic and curious.

The two groups (A and B) did not maintain an even progress level. Group A was ahead of B throughout most of the course. Group B appeared to be less cooperative than A and most of the students in Group B seemed to have their thoughts elsewhere. Most of the students wanted to be at the terminals instead of the classroom. By contrast, Group A was very cooperative with everyone participating in discussions. These students wrote several small programs for simple tasks.

As a general rule, girls seemed to be less adept at or interested in computer science than were the boys. A few of the girls required extra help to catch up with the class; this was provided after regular class hours.

Some students had difficulty understanding what was taking place and the instructor had to explain each statement used. Some students had difficulty writing simple programs; however, as more instruction was received, they appeared to have a better concept of how to write programs. Nevertheless, it was quite apparent that the students were not ready to write programs on their own. Even the sharpest students had to be led step-by-step through the solution finding process. More computer time should be allocated in future programs because two hours a week on the terminals is definitely not enough time to accomplish the objectives of the program.

Even by the end of the sixth week, there was still much confusion among most of the students. Group A, as well as B, was confused in general and had to be led through assignments. However, unlike students in Group B, a few Group A students finished writing their programs in time to work on the terminals.

MATHEMATICS PROGRAM

Course Outline

Each class received a total of four hours of math instruction each week. Two hours were devoted to traditional lecture-demonstration instruction and two hours to small group tutorial sessions. Emphasis was placed upon developing skills applicable to energy and computer sciences.

Energy Objectives. Students should be able to identify:

1. Common types of energy used by families.
2. Major national changes by type amount and cost of energy consumption.
3. Energy savings for a home.

Computation Objectives. Students should be able to:

1. Compute what fractional part one number is of another
2. Simplify fractions
3. Express a problem as a proportion
4. Solve a proportion problem
5. Add, subtract, multiply, and divide decimal fractions
6. Write numbers in scientific notations
7. Solve for the unknown in a percentage problem
8. Compute the percent of increase or decrease
9. Interpret and construct line, bar, and circle graphs
10. Identify and construct elementary math proofs
11. Identify and construct mathematical models for natural phenomenon
12. Classify numbers as natural, integer, rational, irrational, and complex.

Program Organization. The program was organized as follows:

Week I. Introduction to mathematical way of thinking. Review of fractions and decimals.

Week II. Elementary numbers theory related to primes. Review of decimals and proportions, including percents.

Week III. The fundamental theorem of arithmetic, review of percents and broken line, bar, and circle graphing.

Week IV. Bar, circle, and broken line graphing; modular arithmetic.

Week V. Expansion of number system to include non-positive rations. Review of fractions, percent, and decimals.

Week VI. Small group explorations of topology, number theory, and algebraic system.

Course Summary and Comments

The entire course emphasized mathematics which are used in the study of energy and computer science. The division of students into two groups resulted in two classes with very different personalities. One group (A) appeared to be more motivated and its members were more willing to take risks and more willing to try new ideas. Students in the second group (B) tended to sit in cliques and seemed to be less eager to offer a suggestion about solving a problem. Once a method and/or solution was offered, this group agreed unanimously with the proposal. For example, the group agreed with one student who stated that $2^0 = 0$. By contrast, in the first group, there were five highly debated solutions for 2^0: 0, nothing, 2, 1, and 6. Both groups initially resented the instructor's unwillingness to answer all questions. "Why don't you just tell us what the answer is!" was often heard early in the first week.

The small tutorial sessions revealed that some material, which had been scheduled for review only, needed to be taught thoroughly. This required devoting more time to junior high school arithmetic than had been planned.

Despite this need for a review of fundamentals, both groups handled abstract material well, begining with the third week. Some students seemed to have convinced themselves that they could not understand math and insisted on keeping this image of their self-ability. By the end of the third week, a review of student workbooks indicated that, even when computation skills were understood, the students still had difficulty with simple one-step work problems and multi-step problems were missed almost completely. It was evident that students had no clear concept of the advantages of working problems using a linear format. Even those students who had no difficulty in solving word problems were unable to solve problems involving the same manipulations but with non-integer numbers. This may have been caused by students' difficuly in thinking in a linear fashion; they seemed to grasp concepts as a whole but not in sequential parts. I wonder if this is a cultural trait? I once watched some children learn a disco step. There were about 12 black and latin junior high girls in the group and two white girls. The black and latin girls watched the instructors for about a minute and then tried the dance movements. They asked no questions but made comments such as "Move!" Let me see...," "This doesn't feel right," "Hey, I've got it!" Both white girls wanted the demonstrators to slow down, to do one step at a time. I found it intriguing that the black and latin girls did the whole thing at once while the white girls did it bit by bit.

At the end of the fourth week, homework was stopped because of the work load caused by English and science projects. There were more absences during this week (four in one day) than in previous weeks. There appeared to be no problem in student recall of algorithms needed to solve the algebraic materials but both groups had difficulty recalling arithmetic procedures. There was difficulty in reading bar graphs and interpreting information presented.

Throughout, half of the class periods were devoted to small group or individual study and half to the lecture, presentation-discussion method. By the end of the course, there was no apparent difference in performance of the two groups. Both were working well and at a high level.

SCIENCE PROGRAM

Course Outline

The science program each week focused on one or more energy forms. The two-hour class period was divided as follows:

15 minutes: Introduction, instructions, background information

45 minutes to 1 hour: Science experiments, based on topic of the week

45 minutes: Work on individual science project/research

15 minutes: Conclusion of day's experiments; relating scientific discoveries to reality.

Students used the first week to select science projects areas of interest for research and to submit a proposal for approval. Students work individually or in small groups. Projects were to be completed within a four-week period.

Program Organization. The program was organized as follows:

Week I. Introduction to energy, selecting a research project and submitting it for approval, explanation of lab safety requirements.

Week II. Electrical and chemical energy. A comparison of various fuels, measurement of temperatures generated by each fuel; discussion of depletion of resources and other facets of fossil fuel development and use.

Week III. Solar energy. The possibilities and problems of solar energy; collecting and measuring solar energy.

Week IV. Wind. The possibilities and problems of wind power.

Week V. Other energy sources (seminar week): refuse, biomass, ocean, geothermal. Recap of energy sources explored, future possibilities: where do we go from here.

Emphasis throughout the courses was placed on conservation. Other topics included experimental design, research techniques, scientific methods, politics of energy, and decision making.

Course Summary and Contents

The six hours per week science lab focused on "Energy". This emphasis, while limiting the scope of proposed science projects, made it possible for the program to support a hands-on participatory approach in the laboratory that would give students an opportunity to design and develop their own research experiments. Centering the curriculum around a specific theme also seemed practical and realistic in terms of the relatively short time allotted to course preparation (2-1/2 weeks). The energy focus also enabled the instructional staff to anticipate the kind of equipment and

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supplies needed for student experiments based on weekly topics and for the individual and small group research activities. The following summarize the objectives of the science laboratory:

- Focus on energy.
- Development of a "hand-on" participatory approach to the learning experience.
- Emphasis placed on encouraging both individual and small group research project activities.
- Assist students in the documentation of their work, and the development of a research paper based on their science projects.

Problems in the classroom became apparent during the fourth week when participants increasingly expressed their frustrations in "acting-out" activities, and there was approximately 20% drop in attendance.

Examples of student research projects are provided on page 41.

Several elements were identified as inhibiting the learning process. The two most apparent obstacles were:

1. too many students in the classroom at one time; and
2. the average attention span of most participants seemed limited to approximately one hour.

After the initial hour (devoted to science experiments based on the topic of the week) many participants became increasingly restless, making it more difficult for other students to sustain interest and focus on their own research projects. This daily phenomenon was marked by a significant rise in the noise level and general laboratory movement. Participants also complained about the degree of emphasis placed on energy topics. Many felt this focus was too confining and that the study of other science disciplines would be far more interesting.

Underlying symptons of general classroom frustration were other factors which related specifically to more academic issues. Many students seemed to find it difficult to work independently or in small groups, especially in a classroom where instructional guidance was available upon request. This difficulty became most apparent when students became impatient at not being able to get immediate responses to their questions. At times, the two instructional staff members in the laboratory seemed overwhelmed with requests for assistance (student-teacher ratio was 12.5 to 1).

The first experiment on the topic of the week provided the head teacher an opportunity to introduce and discuss the application of the "scientific method".* However, it seemed to be difficult for most students to apply the "method" to their own science projects during the second half of the lab session. It was also difficult for many students to assume the responsibility for designing their own projects and conducting their own experiments. Their dilemma suggested that most of them had had little exposure to laboratory procedures or the opportunity to work independently of group activities within a science lab setting.

As a result of these concerns, the following changes were instituted in the science program during the fifth week:

1. The number of students working in the Laboratory at one time was reduced from 25 to two groups of 12-13 per group. Each group was assigned one hour per day to work in the lab on their science projects. An additional room was used to enable the group not in the lab to work with the assistant teacher in writing up their research and experiment activities.

2. Both the lab and documentation period were reinforced by the development of a written research format** that outlined the components of the final research paper. The development of Section I, the presentation of informational background, became the responsibility of the Communication Skills Workshop and its instructional staff. The remaining sections of the research document were to be developed under the supervision of the assistant science teacher in the documentation period. These sessions also provided an opportunity for students to review their laboratory notes and to prepare for the following day's lab period.

3. Another staff member was assigned to assist the head teacher in the laboratory, providing additional ability to respond the students' questions and concerns. This additional instructor and the decrease in the total number of participants in the lab at one time reduced the student-teacher ratio by half (6.5 to 1).

These program revisions dramatically curtailed laboratory noise and disruptions; sharply increased the general quality of the student's lab work; provided for more lab structure and staff support; established designed "check-points" for the instructional staff to review and monitor each student's lab and documentation activities; and placed greater emphasis on the integration of subject materials, especially between the science program and communication skills workshop. The scheduled "Project: Earth, Wind and Fire" Open House Program also helped to create a focal point for finishing lab projects and completing research papers.

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*The scientific method was outlined in four major steps: 1. The formation of a question. 2. The development of a hypothesis. 3. Testing the hypothesis. 4. Reaching a conclusion based on the hypothesis.

**See page 48 for research format entitled "Project: Earth, Wind, and Fire."

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**See page 48 for research format entitled "Project: Earth, Wind, and Fire."

STUDENT SCIENCE PROJECT: EXAMPLE 1

Name: M. L.

Question: How does a steam engine generate electricity?

Material: An empty soup can. Heavy aluminum foil. (Frozen food tray, pie pan, etc.) Aluminum wrapping foil. Straight pin and 8" length of stiff wire (coat hanger). Stick about 12" long. Small pot. Glue. Tape. Rubberbands.

Procedure: If not aleady off, remove the lid from the soup can. Throw lid away; rinse out can.

Turn the can upside down and punch two 1/8" holes opposite one another in the bottom. Locate each hole about 1/4" away from the rim.

From your frozen tray or pie pan cut out a flat disk equal in diameter to that of the can. Pierce a hole in the center of this disk with a straight pin.

Take some aluminum wrapping foil and wad it up into a little ball the size of a small cherry. Glue this ball to the disk, centered right over the hole. It will prevent the disk from wobbling badly.

After the glue has dried, put the pin in the disk hole and push it through the ball. Try to get the pin as perpendicular to the disk as you are able. Now enlarge this hole slightly with a thicker pin or needle. The idea is to have the disk and ball spin freely on the pin.

Make eight equally spaced "pie cuts" in the disk with a pair of scissors, cut all the way to the ball.

Twist each "pie wedge" slightly to form the turbine wheel.

Bend the stiff wire, as shown, make sure that when the wire is later attached to the can, the small downward segment will point to the can's center.

Slip the straight pin through the turbine and tape it to the support wire. Then tape the support wire to the can so that the turbine is as close as possible to the can without touching it. Blow on the turbine to test it. It should spin quite easily.

Fasten the stick to the can with a rubberband or string.

Now for the steam. Put a cup or two of water in a small pot. Before heating the water, cover the top with aluminum foil, pinching the edges all the way around and make a pencil sized hole in the center.

Bring the water to a boil. When the steam starts jetting from the hole, lower the can over the hole, using the stick as a handle. The steam pouring from the two holes in the soup can will start the turbine spinning merrily.

STUDENT SCIENCE PROJECT: EXAMPLE 2

Name: A. O. and T. M.

Question: What is the difference between alternating current and direct current?

Materials: (list them)

One measuring cup
corn starch
potassium iodide
two 6-volt dry cells
train transformer
two pie pans
two large cloths
strips
bell wire

Procedure: (what are you going to do)

Direct current. Wire the negative post of the other battery. Turn a pie plate upside down, and connect a wire from the free negative post to the outer rim of the plate. Attach a wire to the remaining positive post. Using this wire as a stylus, draw it across the cloth, a solid line will appear. Alternating current. Use the transformer instead of batteries, attach a wire to the pie pan, and do almost everything that is in direct current.

STUDENT SCIENCE PROJECT: EXAMPLE 3

Name: L. B. and L. R.

Question: How does the weather affect the temperature and humidity in a solar greenhouse?

Materials: (list them)

7 pieces of corrugated cardboard, 50 cm of W and 40 cm of L. Clear plastic, 3 or 4 mil., 50 cm x 450 cm. Flat black spray paint, white spray paint, 2 thermometers, plastic wrap, tape, string or thread, 15 tin cans, 15 rubber bands, insulations (styrofoam, cardboard, newspaper), soil, 4 pots, 4 plants, barometer.

Procedure: (what are you going to do)

I'm building a solar greenhouse. I intend to grow potted plants inside the greenhouse. I will measure the temperature with a thermometer and the humidity with a barometer and I will compare the results with the weather conditions.

STUDENT SCIENCE PROJECT: EXAMPLE 4

Name: C. B. and K. F.

Question: Which produces more voltage, a savanius rotor or conventional windmill?

Materials: (list them)

clothes hanger, 5" x 5" cm of balsa 1/2" thick, hobby knife, 2.5" x 14.5" x 1" cm balsa 1/16" thick, cork, 2 wooden spools, tape, 3/16" balsa dowel 35.5" cm long, 1 empty saltbox, magic markers (3 colors), light bulb volt meter, copper wire

Procedure: (what are you going to do)

Build both conventional and savanius windmills and test the amount of voltage put out by each. We will then test the amount of voltage produced by each one on the voltmeter and light bulb.

STUDENT SCIENCE PROJECT: EXAMPLE 5

Name: D. E.

Question: How much methane gas can I collect in 2 days from 1/2 cup of coal.

Materials: (list them)

coal
funnel
quart jar
water test tube
rubber band

Procedure: (what are you going to do)

1. Hammer the coal into a coarse powder
2. Put the coal inside the funnel and place inside the jar
3. Fill the jar with water, fill the test tube with water, and place it over the funnel.
4. Mark the test tube at the water line with a rubber band or china marker, then methane will begin to collect in the test tube.
5. After the test tube seemed to be filled, will the coal still give off methane gas? This should take about 2 days.

COMMUNICATIONS SKILLS PROGRAM

Course Outline

The Communications Skills Program was designed to support the overall SRAP objective of encouraging and supporting research and development in energy and its supporting technologies. This support was provided by designing a writing component to assist the student in learning how to express ideas in a positive manner. Each class received five hours of instruction each week with approximately half of that time devoted to small group study periods. Dail lectures, exercises, and experiments provided students with an opportunity to explore avenues and means of expressing their ideas on paper.

Program Objectives. The Communications Skills Program had the following objectives:

- To develop basic writing skills
- To teach the student to build and express ideas in a much more specific manner
- To conduct seminars in which students presented and discussed papers and in which students discussed presentations by leading scholars in the energy field
- To develop student skills in note-taking, vocabulary development, and reading habits.

Program Organization. The Communications Skills Programs was organized in the following manner:

Week I.	Introduction
Week II.	Organization and Development of Ideas
Week III.	Research and Creative Expression
Week IV.	Process, Punctuation, and Precision
Week V.	Vocabulary and Public Speaking
Week VI.	Seminar and Project Presentations

This program was a "learn-by-doing" course which emphasized student participation to the highest degree possible. Although primary emphasis was on expository writing, there were many exercises concerned with creative thinking. Analytical and descriptive essays were part of class assignments. Wednesdays were devoted to in-class writing exercises. Monday and Friday classes were lectures and discussions; Tuesday and Thursday classes were conducted as "cluster" work groups to provide specific concentration on problem areas.

Each Friday, students were required to bring a publication clipping relating to energy, the politics of science, a significant scientific discovery, a local person of scientific distinction, or articles concerning minority groups in science. This requirement was designed to foster student reading of magazines, newspapers, or other publications.

Each student was required to maintain an energy journal which was to include notes of class discussions, summaries of media clippings, and other matters related to the overall SRAP project. Reading assignments in communication skills were given on Fridays. No other homework assignments were

made. This placed responsibility on the student to budget his time for the development of his individual research paper, reading publications to find clipping materials, and reading in the general field of his individual science research project.

Course Summary and Comments

Although the students were much better prepared than had been anticipated, there was still need for direct attention to organizational and writing skills. The majority of the class at the outset read well, wrote with some sophistication, and were able to express themselves well verbally. Vocabulary and scope initially were quite problematic for the majority. To assist in developing better vocabularies among the group, volunteer Scrabble games were organized during the noon period. A more active curriculum would have assisted the instructors because the combination of summer, the ages of the students, and their disciplinary backgrounds made it difficult to depend on the lecture and discussion method during a fifty-minute teaching session.

Students showed great eagerness in participating in various class activities. Their desire to be recognized and to share their thoughts was actually overwhelming. One could see how little attention they had received in school and that they had a very limited sense of decorum and how it works in a situation involving more than two individuals.

The requirement for students to write on a weekly basis proved sound because it made it much easier for the students to see their errors and to correct their mistakes. The requirement also forced students to think in a more constructive manner. Getting students to eliminate jargon from their writing was difficult; it was a matter to teaching them not to write in the manner with which they spoke.

It was interesting to note that there were some students who were really quite sharp who tried to "play it down" in order to spare their peers. Although there were no real dummies in the class, some were certainly brighter and more productive. These individuals seemed to be willing to hang on limply rather than perform brilliantly.

One student with a Chinese background needed assistance in using English as a second language because he seemed to think in Cantonese and then translated his thoughts into English. The instructor encouraged him to improve his English ability by emphasizing that being bilingual would be a definite asset within the next seven to ten years, especially in college.

It was noted that Group A appeared to accomplish more than Group B. (This experience paralleled that of other program instructors.) Group A students handeled their presentations well, as a rule, while Group B students seemed unprepared and disorganized.

The initial visit to the library proved to be most useful. It was the first time that most of the students had visited a technical library and the technology supporting the library appeared to fascinate them as much as the books. The librarians were very helpful and provided our students with abundant resources applying to their individual research projects. Unfortunately, the SRAP students had not been authorized to check-out materials

from the library. It is hoped that some arrangement to do so can be made for next year's students.

Process proved to be something very new to the students and they usually pulled something together in a matter of minutes that did not necessarily reflect the scope of a particular situation. The class had difficulty understanding why one has to use supporting information and why the source must receive credit. Although some had heard about footnotes, most had no idea of what footnotes were about or their purpose.

As a whole, the class initially had little sense of punctuation or the purpose of punctuating a sentence. Using a comma was difficult for them and it received much misuse. Colons and semi-colons were completely foreign. The students wrote run-on sentences consistently and did not seem aware of the difference between main and subordinate clauses.

Requiring the class to make oral presentations and to read aloud proved to be a positive asset in developing a better vocabulary and in understanding needs for punctuation. Reading aloud also seemed to give better understanding of what the individual was reading.

In more than 60 percent of the student papers submitted during the sixth week, there was definite improvement in the writing ability of the student author. This was indicative of what can be accomplished in the short space of five weeks. Some students proof-read their papers; some also defined terminology essential to their respective projects. Writing as a whole was much more cohesive. This is attributed to writing on a regular basis rather than to the teacher. In the opinion of the head instructor, keeping a journal is an excellent means of developing a serious attitude on the part of the student insofar as the process of writing is concerned.

All the objectives of the course were touched upon during the six weeks but only three were met in specific ways. Much difficulty was caused by the inadequacy of the classroom assigned. It was noted that, in working with students of this age, a hard and precise line produces much more and better work. The students appeared to appreciate the instructor more when the teacher was tough and fair than would have been true if the teacher had been nice and one with whom the students could pal around. It should be noted that significant personal growth also took place, in addition to the improvement of communications skills.

Seminar Papers for "Project: Earth, Wind, and Fire"

As a combined science and communications skill project, students were required to prepare a seminar paper concerning Earth, Wind, and Fire. Papers were to be approximately eight pages long and were to incorporate the findings of a project researched as part of the science course. A copy of the student instruction sheet, which was given out the first week of class, follows this report. These papers were displayed at the Open House; selected students also made oral presentations based upon their papers at that time.

SCIENCE PROJECT RESEARCH PAPER OUTLINE

PROJECT: EARTH, WIND AND FIRE

At the end of this 6-week course you should have completed a science experiment that is documented by a research paper. The research paper is a combination of your research efforts from your English and Science class combined with your experimental data and information. Your final paper should carry the following information:

I. Informational Background/Research: 3-5 pages (turned in to Daphn)
An expository paper that should contain the following:

A. What energy area you are doing your project on--solar, electricity, wind, etc.

B. Information on this energy area (below are some topics you might want to consider)

- history of your energy use
- how the energy is being used today
- how is the energy utilized--is it a primary (direct) source or a secondary source (indirect)--what's needed to produce the energy--a generator? collector?
- is your energy source renewable or non-renewable? How much is left? How long will it last?
- Problems with this energy form? Pollution? Expensive? Dangerous?
- Interesting information you'd like to include about your energy form.
- Future--what is the future possibility of your energy source?

II. Introduction to your experiment--1-2 pages (turned in to Deborah)
How does your experiment relate to the energy you are researching?

example 1: if you are doing a solar oven--how does it use solar energy? Why is the development of solar ovens important?

example 2: if you are showing growth of plants with solar energy you might want to ask--how do plants use solar energy to grow? What do plants produce using solar energy? What value is knowing all of this?

III. What are you going to test--A statement of what your experiment is trying to show and how? A descriptive statement of what it is you are trying to show, why, and how you are going to do it?

IV. Experiment

1. Question
2. Hypothesis
3. Materials

4. Procedure: 1-2 pages in detail, a step-by-step description of what you did in your experiment. This should also include drawings of anything you made (on a separate piece of paper)
5. Data: a detailed list, chart, graphs of collected data

V. Conclusion--(1/2-1 page) what does your data tell you, why is what you discovered important? How did what you discover relate to what you know about your energy source?

Science Project Format

I. Introductory research/Informational background--(3-5 pages)

II. Introduction to your experiment--(1-2 pages)

III. Your science project--a description of what you are testing and how.

IV. Experiment

a. question
b. hypothesis
c. materials
d. procedure
e. data

V. Conclusion--what you found out

COURSE MATERIALS USED IN THE SRAP PROGRAM

1. Additional information concerning the "Science Activities in Energy" series may be obtained from the American Museum of Science and Energy, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, Tennessee 37830.

2. "Mathematics for Children: Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy," Grades 8 and 9, National Science Teachers Association, U.S. Department of Energy, Office of Education, Business, and Labor Affairs Report No. HCP/U3841-02 (August 1979).

3. Ricki Blau, Communicating with Unix, Computing Services, University of California, Berkeley, California (September 1979).

4. James Joyce, Edit: A Tutorial, Computing Services, University of California, Berkeley, California (August 1979).

5. Richard Pattis, Robot Programming: A Gentle Introduction to the Art of Programming," Computer Science Department, Stanford University, Palo Alto, California (1979).

6. Black Contributors to Science and Energy Technology, U.S. Department of Energy, Office of Public Affairs, Report No. DOE/OPA-0035(79) (1979).

7. Living in a Changing World, "Exploring Technology, People, and Environment Series", Student Workbooks 1 and 2, Research Foundation, State University of New York (1975).

8. Minority Contributors, I and II, National Coordinating Center for Curriculum Development, College of Engineering and Applied Sciences, State University of New York at Stony Brook (September 1978).

APPENDIX C

GROUP COUNSELING

GROUP COUNSELING

COURSE SUMMARY

The purpose of the Group Counseling Program was to provide students with a forum to discuss non-academic issues. Discussions were generally stimulated by activities which encouraged participants to assume both a positive and an active role in the group process. Counseling sessions related to:

- Exploring male-female role models and relationships with peers
- Identification of personal "inhibitors" in learNing
- Encouraging participants to strive for greater self-awareness and exploring the impact of being a minority student within the traditional educational environment.

These counseling sessions were a cohesive element for the SRAP program because they enabled students to air their views on the SRAP classes and activities on a regular basis. Counseling sessions were scheduled for one hour each week. Group counseling included psycho-drama, role playing activities, and hatha (exercise) yoga.

Although many students appeared to enjoy the novelty of the counseling sessions and discussions, most were generally conservative in their attitudes. Some students were quite reactionary to activities and issues that seemed either new or foreign to them. This was especially true of hatha yoga. Some students viewed yoga as an unwelcome remnant of the "hippie" culture and were not receptive to the idea that yoga is a system of physical exercises for maintaining good health and both mental and physical well-being.

An area of concern was the extent and degree of hyperactivity among the SRAP students. Although this may be normal for this age group (early adolescents), the degree of hyperactivity exhibited appears to have been excessive. Hyperactivity was demonstrated by students who became impatient while waiting for assistance from the staff or wanting to immediately contribute to group discussions. Students generally tended to ignore proper decorum and demanded instant attention. This issue was included in a counseling session using the following hypothetical incident:

> Ray was overwhelmed by confrontation with four people speaking to him at once. His classmates were entertained by his confusion. I asked Ray how he felt and then asked the class why I had created this staged situation for them to observe and comment upon. One student immediately associated this hypothetical situation with a similar experience involving several students the previous week. I indicated that other instructors had had similar situations in their classes. I explained that a person finds it difficult to function when overwhelmed by his or her surroundings.

After a series of incidents involving SRAP students, a counseling session was held on "social responsibility." The incidents leading to this discussion included several boys peeking into the women's locker room window in the Harmon Gym, students discovering ways of transmitting four-letter obscene words on the computer, and unnecessary noise and over-activity in hallways of UCB buildings. It is interesting that the term "social responsibility" appeared rather alien and strange to many of the students. The discussion was followed by a written requirement for each boy to define social responsibility and to cite examples of how this responsibility had been violated by SRAP students. The assignment was given only to the boys in the class because the girls had not been implicated in any of the incidents. Samples of the papers submitted follow this appendix.

Behavioral problems were minimal during the six-week course, despite the incidents mentioned in the above paragraph. When disciplinary action had to be taken, students generally assumed that the instructional staff was responsible for keeping them "in check." The concept that each person was responsible for his own conduct and that "acting-out" behavior should be tempered by self-control seemed rather bewildering to many students. This concept was discussed during counseling sessions and reinforced by instructional staff members dealing with behavioral matters. The novelty of the idea to many students would suggest that, perhaps, most students in a traditional educational environment have been conditioned to expect teachers to also assume the role of policemen. For many students, an understanding and development of social responsibility were thwarted by the normal school setting.

SOCIAL RESPONSIBILITY ASSIGNMENT

1. Define "Social Responsibility"

2. Describe how this responsibility has been violated at least once by SRAP students

3. How can you as a SRAP participant insure that you live up to your social responsibility.

Example 1

Social responsibility is to have respect for other people. Sometimes you have to give up something to live up to that. To have respect for other people's privacy. To try to be nice to them when they aren't to you. If you are nice to others they will be nice to you in return. If you don't want anyone to do anything to you, don't do it to them. You should have consideration for others.

Students here have violated the privacy of others. They have used the computer to get some laughs. They have invaded the privacy of the womens locker room. They have also disturbed the students and professors of this college with their noise.

I could not make noise in the halls and try to keep talking at a whisper. I would not put dirty messages on the computer. Not look in the ladies locker room. I could try to think about the things I do before I do them, because I was lucky to get in this program in the first place and should conduct myself accordingly.

Example 2

To me social responsibility means having self control over one's mind. Social responsibility means having respect for older people and people of your own age group. Social responsibility means caring for another persons feelings. Social responsibility also means taking the problems in life and straightening them out the best you can as well as helping another person with his or her problems.

The students of the SRAP program over the last four weeks have violated certain rule and regulations. They have violated the rule that the young men are not supposed to enter the women's locker room. They have violated the rule that there is not to be any noise in certain areas of the facility in which they are using. They have also violated the rules about using the computers.

I can ensure myself as an SRAP participant that I live up to my social responsibilities by giving the other people using the same building and grounds that I'm using respect and courtesy. I have to admit I did violate some of those rules and regulations that I mentioned above, but I stopped and realized that jokes could get me into a lot of trouble.

Example 3

Social responsibility can be defined as pertaining to the welfare of human society. To rules and regulations of society that circumscribe individual action through the inculcation of conventional sanctions and the imposition of formalized mechanisms. Or, more simply, respect for other people, their rights and needs, and for the welfare of society as a whole.

Social responsibility has been violated too many times by SRAP participants. These actions unfortunately cannot be altered and may present a bad image of SRAP students in the years to come. One can calmly walk in the almost deserted halls of LSB and can listen to the haunting sound of their own feet against the floor, but as soon as they near the afternoon science lab the noise of their feet is muffled by the yelling and restlessness of the SRAP students.

I regret to say that I have been a little over the noise limit myself and am sorry for any bothersome noise that I have contributed. And I shall try and conduct myself a little more mannerly.

Example 4

The definition of social behavior is very long. It can mean a lot of things such as, how you act in front of people, the way you act with a lot of people around, or what you do to conduct yourself. Social behavior is also an important factor in your life. When you show your social behavior your're really showing people how you really act toward anyone you ever will meet.

One time the social behavior of some students was very immature. They invaded the privacy of the girl's locker room while the girls were changing their clothes. I would say that what they did was very immature and irrational. In a way what they did was funny and in other ways it was just terrible. I understand that the girls hated it and despised what the boys did, and so did I.

I have always lived up to my social responsibility. I know not to be noisy in the halls, or to write profanity on the computer. I am not saying that I am the most perfect thing on earth, everyone has their faults. I am just saying that I know how to conduct myself in front of a group of people.

Example 5

Social responsibility is your responsibility to other needs. You should always be aware of things you do that may annoy others. For as it was said. "Do unto others as you will have them do unto you". Eg., young boys about 13 are sitting in an area you specified for senior citizens yet they do not yield the seats. That is lack of social responsibility.

This responsibility has been violated several times. One of the most recent was when the girls peeked in the boys locker room, and the boys peeked into the girls locker room. This violated not only SRAP participants privacy but also the privacy of other users of the gym.

I can live up to my social responsibility by being quiet in the halls, not bothering objects in the hall, staying in my part of the gym, report others who venture into the opposite sex's locker room or other violations and report people who do not consider others.

Example 6

The word social responsibility means showing respect for people's feelings. You should always treat people like you would want them to treat you. When you be nice to people they will respect you more and you will feel better about yourself. I've seen people turn on their radio on the bus just because the driver is black, and when he tells them to turn it off they go off on him, that shows the lack of social responsibility.

The social responsibility has been violated in many ways by SRAP students (boys), for example some boys who know and wanted me to go with them, went into the girls locker room. Some boys also wrote four letter words to people outside of the program. The last and maybe most serious of them all is that we all are making noise in the building. Whey I think it might be the most serious is because we are using other people facilities and were violating their primisis.

As a SRAP participant I can insore that I live up to my social responsibility by respecting others well being, being curtivs to others, try to be nice to everybody, and if I have to say anything bad about anybody I will keep it to myself.

P.S. After your speech I realized that we've have took advantage of you kindness and I'm SORRY!!

APPENDIX D

EXTRA-CURRICULAR ACTIVITIES

Recreational Program
Field Trips
Film Program
Picnic
Open House

EXTRA-CURRICULAR ACTIVITIES

A number of extra-curricular activities were scheduled during the six-week SRAP program. These included the recreation program, field trips, a film program, and the Open House held at the end of the sixth week. These activities were designed to the overall education and enlightenment of the students in the SRAP program.

THE RECREATIONAL PROGRAM

Students participated in a planned recreation program one hour a day, three days a week. These sessions were held at the Harmon Gymnasium and included swimming, indoor activities such as volley ball and basketball, and outdoor track and field sports.

It is suggested that future SRAP recreational programs be expanded to provide one hour each day for sports. This physical outlet significantly helps alleviate pent-up tensions and general restlessness which, if ignored, can make the classroom learning a less enjoyable experience. Organized recreational group activities tend to promote positive social interaction and cooperation among the participants as well as supporting the development of increased mental and physical concentration.

SRAP staff members should be encouraged to participate in these recreational activities because such participation gives the students an opportunity to interact with instructors in a non-classroom environment. This is important because joint participation will emphasize to the students that teachers are in fact human beings with the strengths and weaknesses that generally characterize the species.

FIELD TRIPS

Field trips were generally scheduled for Thursday afternoons and were supervised by the science program instructors. Other teachers assisted when additional help was needed. Field trips were made to:

The Integral House, Berkeley: An energy efficient model facility providing educational tours and workshops on energy saving and alternative energy devices for the home.

Pacific Gas and Electric Energy Exposition, San Francisco.

Lawrence Berkeley Laboratory, Berkeley: Small group tours conducted by SRAP Advisory Committee members.

Exploratorium, San Francisco: A do-it-yourself, hands-on museum on sound and heating, heat and temperature, electricity, animal behavior, color, light, and touch.

FILM PROGRAM

A total of five films were shown during the six-week period. These films concerned communication skills and energy-related topics:

Definition of Language	30 minutes
Language and Writing	29 minutes
Hopis: Guardians of the Land	10 minutes
Saving Energy at Home	10 minutes
Energy Crisis: the Nuclear Alternatives	52 minutes

The success of this film series is questionable. Equipment problems detracted from the overall presentation on two separate occasions. Many of the films were out of date; these were not well received by the students. It is recommended that films be previewed by the staff to determine suitability for a SRAP audience. This may be time-consuming, but a preview of each film will assure that it will effectively augment course work and student research efforts.

PICNIC

An all day picnic and recreation program for students and staff members was held on July 31 at Tilden Park. The importance of social interaction might have been underestimated, and more activities of this type should have been scheduled throughout the program. Students sought out role models among the instructors and staff and were generally eager to develop relationships with staff members who were accessible to them.

OPEN HOUSE PROGRAM

An Open House Program, entitled "Earth, Wind, and Fire: An Evening with Energy" was held on Thursday evening, July 31. This event was the focal point of the summer program and provided an opportunity for SRAP students to display their science projects and research papers to parents, invited guests, and the SRAP staff. Students were prepared to discuss their experiments and, in some instances, to demonstrate the results of their research. Science projects and research papers concerned a variety of energy topics including:

Voltage Production of Savanius and Conventional Windmills
Production of Methane Gas
Effect of Weather Temperature on a Solar Oven
Difference between Direct and Alternating Currents
Effect of Solar Energy on the Comparative Development of Marigolds and Coffee Plants
Heat Retention in Four Substances: Gravel, Sand, Dirt, and Metal
Conductivity of Liquids in Electricity
The Most Efficient Material for Storing Energy
Potentials of Solar Collectors
Building a Solar Oven
How Energy is Lost in Changing Forms
Geothermal Energy
Fossil Fuels and Energy Recovery Techniques

Electricity and Ocean Currents
Plant Growing Inside a Solar Greenhouse
Construction and Use of a Solar Water Heater

Students were encouraged to participate actively in planning and conducting the Open House Program. A student committee was formed to recommend activities and to assist in organizing the events selected. These students were instrumental in arranging for a refreshment table, setting up the multipurpose room, and developing the program agenda. The group also appointed two students to host the program and four students to make oral presentations of their research projects.

APPENDIX E

PRE- AND POST-ASSESSMENT EXAMINATIONS

Communication Skills Tests
Science Test
Mathematics Test

COMMUNICATION SKILLS

PRE-ASSESSMENT EXAMINATION

Summer Research Apprenticeship Program — June 7, 1980

Composition and Writing Component — Daphne P. Muse
Lawrence Berkeley Laboratory — Instructor

For the next forty-five minutes, please think through and write a two to three page essay on one of the following questions or statements.

Make certain that you write specifically to the question you select. Use a blue ink pen. Do not use pencil. Do not write on the back of the paper.

1. Develop your ideas on the more efficient use of solar energy.
2. Nuclear Energy: Can it Be Used to Benefit Humanity?
3. How Can My Own Personal Energy Be Used More Effectively?
4. The Role of Engergy in the Twenty-First Century
5. In the Year 2001 I will be...

POST-ASSESSMENT EXAMINATION

Summer Research Apprenticeship Program — July 29, 1980

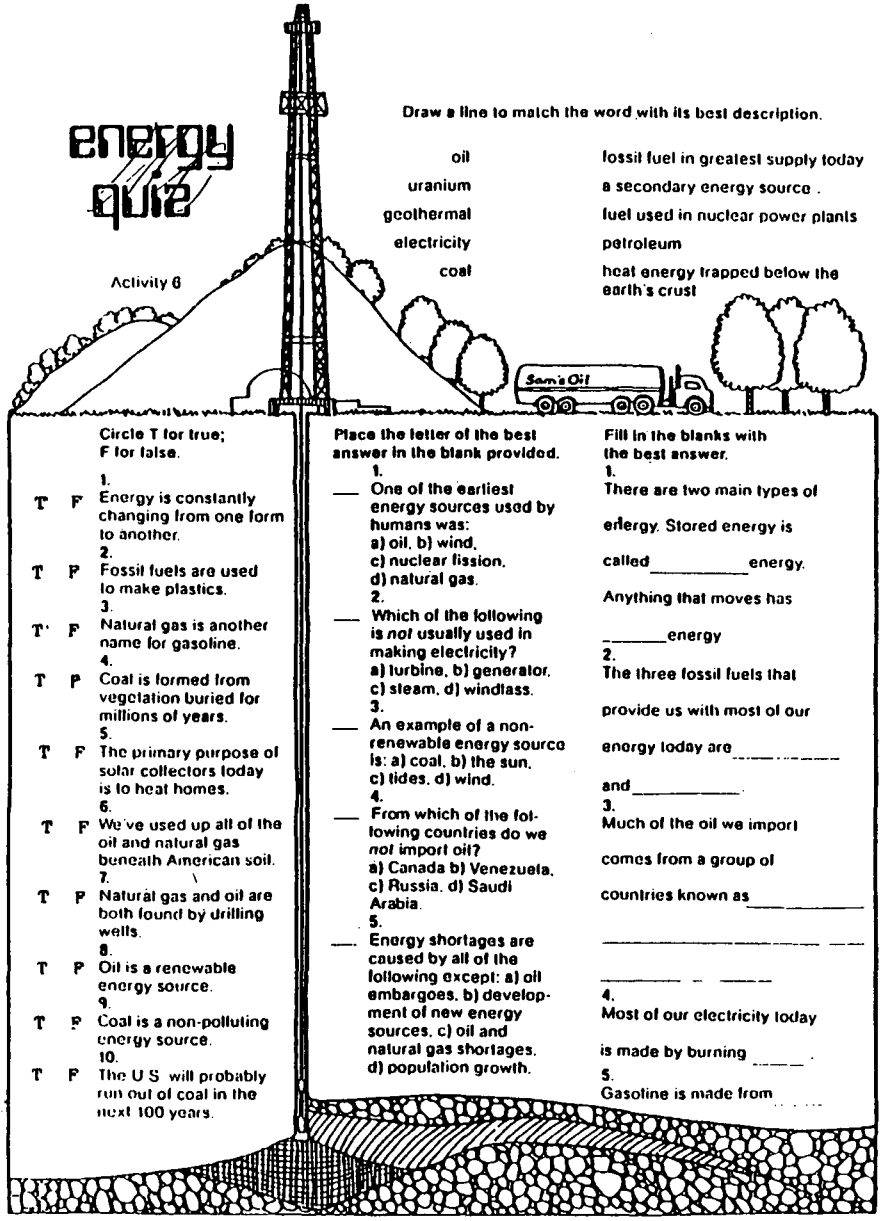
Composition and Writing Component — Daphne Muse
Lawrence Berkeley Lab — Instructor

For the next forty-five minutes, please think through and write a two to three page essay on one of the following.

Make certain that you write specifically on the question you select. Use a pen and do not write on the back of the paper.

1. In the year 2001 I will be...
2. Is it possible for science to serve people and the earth at the same time?
3. Should the government regulate nuclear policy?
4. Does this country have an energy policy that protects people or politicians?
5. Are we as energy conscious as we should be?

SCIENCE PRE/POST ASSESSMENT EXAMINATION



Draw a line to match the word with its best description.

oil	fossil fuel in greatest supply today
uranium	a secondary energy source
geothermal	fuel used in nuclear power plants
electricity	petroleum
coal	heat energy trapped below the earth's crust

Circle T for true; F for false.

1. T F Energy is constantly changing from one form to another.
2. T F Fossil fuels are used to make plastics.
3. T F Natural gas is another name for gasoline.
4. T F Coal is formed from vegetation buried for millions of years.
5. T F The primary purpose of solar collectors today is to heat homes.
6. T F We've used up all of the oil and natural gas beneath American soil.
7. T F Natural gas and oil are both found by drilling wells.
8. T F Oil is a renewable energy source.
9. T F Coal is a non-polluting energy source.
10. T F The U S will probably run out of coal in the next 100 years.

Place the letter of the best answer in the blank provided.

1. ___ One of the earliest energy sources used by humans was: a) oil, b) wind, c) nuclear fission, d) natural gas.
2. ___ Which of the following is *not* usually used in making electricity? a) turbine, b) generator, c) steam, d) windlass.
3. ___ An example of a non-renewable energy source is: a) coal, b) the sun, c) tides, d) wind.
4. ___ From which of the following countries do we *not* import oil? a) Canada b) Venezuela, c) Russia, d) Saudi Arabia.
5. ___ Energy shortages are caused by all of the following except: a) oil embargoes, b) development of new energy sources, c) oil and natural gas shortages, d) population growth.

Fill in the blanks with the best answer.

1. There are two main types of energy. Stored energy is called _____ energy. Anything that moves has _____ energy
2. The three fossil fuels that provide us with most of our energy today are _____ and _____.
3. Much of the oil we import comes from a group of countries known as _____
4. Most of our electricity today is made by burning _____.
5. Gasoline is made from _____

6. What is energy? _____

7. Food energy is expressed in units called? _____
8. Elecrticity is measured in units called? _____
9. The primary energy source used to produce the largest portion of our electrical energy is
   A. falling water C. Oil
   B. coal D. steam
10. A hypothesis is _____.

Fact or Fantasy

Fact Fantasy 1. A gallon of gasoline has the heat energy force of 50 pounds of dynamite.

Fact Fantasy 2. One barrel of oil (42 gallons) contains the heat energy equal to the energy of a man at hard labor for 2 years.

Fact Fantasy 3. A 100 watt bulb could burn for 5 hours on the energy it takes to make one throw-away soft drink can.

Fact Fantasy 4. Three volcanic eruptions within the last 100 years have released more air pollution than all human activity throughout history.

Essay Question (Use the back of this sheet for extra space)

As a Noble prize winning scientist you have just discovered a new source of energy? What is it? How does it work? What is it used for? Describe your new energy source in detail.

MATHEMATICS

PRE/POST ASSESSMENT EXAMINATION

I. Fractions

Solve the following problems. (Give answers in simplest form.)

1. 6 is what fractional part of 15?

2. 2 is what fractional part of 100?

3. 18 is what fractional part of 12?

4. What is 1/5 of 35?

5. What is 4/7 of 28?

6. What is 7/10 of 40?

7. Solve for N: N/9 = 20/36

8. Solve for N: 6/8 = 30/N

9. Hydrocarbons make 15% of the pollution in the air caused by the automobile. What fractional part of the total pollution caused by the auto is this?

10. The percent of nitrogen oxides in the pollutants caused by the automobile is 2/3 of the percent of the pollution caused by hydrocarbons. What percent of the total is caused by nitrogen oxide? (Refer to previous problem.)

II. Decimals

Solve the following problems.

1. 1.2 + .7 + 13.4

2. .75 - .346

3. 5 x 1.4

4. 1.2 x .06

5. 3.25 ÷ 5

6. 2.25 ÷ .15

7. Write in scientific notation: 500,000

8. Write in scientific notation: 1,340,000,000

9. In 1969, accidental spills, such as collisions, oil blow-outs, etc., accounted for 10% of the total oil pollution in the ocean. If 200,000 tons were contributed by these accidents, what was the total number of tons of oil pollution in the ocean?

10. The total energy potential from solid waste (garbage), if converted to oil, could provide 20% of our current oil consumption. If our current oil consumption is 5.5 billion barrels per year, how much oil could be provided by garbage?

MATHEMATICS EXAMINATION (Continued)

III. Percents

Solve the following problems.

1. 15% of 325 = N

2. 130% of 20 = N

3. 5 is N% of 15

4. 30 is N% of 25

5. 45% of N = 90

6. 25% of N = 400

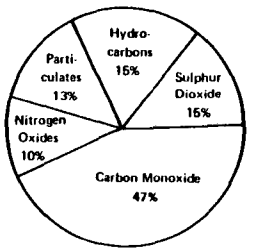
7. What is the percent of decrease from 15 to 10?

8. In 1960, the cost of gasoline was $.30/gal and in 1977 the cost was $.70/gal. What was the percent of increase?

9. Insulation of a home decreases the heating bill approximately 20%. How much was Mr. Page's bill prior to insulating his home if his present bill is $300.00 per year?

IV. Graphing

It has been determined that the total cost for air pollution in 1968 was $16.2 billion, or approximately $80 for each person in the U.S. Information pertaining to air pollution is expressed in the form of a graph.



1. What fractional part of the circle is represented by hydrocarbons?

2. How many degrees of the circle are represented by carbon monoxide?

APPENDIX F

COURSE ASSESSMENT PAPERS

Student Assessments
Teacher Assessments

SUMMER RESEARCH APPRENTICESHIP PROGRAM

Lawrence Berkeley Laboratory

Instructor_____

Date_____

Course_____

TEACHING/COURSE ASSESSMENT

Instructions: Your responses to the following questions will be used by staff and teachers to improve the courses offered by the program.

Choose the rating (1 to 5) depending upon how well the statement fits the teacher or course. (5 is a high rating and 1 is low).

	Strongly Disagree				Strongly Agree
1. Material is presented in a logical and organized fashion.	1	2	3	4	5
2. Material is presented in an interesting way.	1	2	3	4	5
3. Assignments and exams are clear and relevant.	1	2	3	4	5
4. Teacher is responsive to the needs of the class.	1	2	3	4	5
5. Teacher is easy to talk with and appears genuinely interested in students.	1	2	3	4	5
6. Teacher handles disciplinary problems well.	1	2	3	4	5
7. Grading is fair and equitable. (if applicable)	1	2	3	4	5
8. Teaching assistant is easy to talk to and helpful to student.	1	2	3	4	5

	Very Poor				Excellent
9. How would you rate the overall teaching effectiveness of this teacher.	1	2	3	4	5
10. How would you rate the overall teaching effectiveness of the assistant teacher.	1	2	3	4	5

11. Do you feel uncomfortable participating in class discussions or activities?

NO_____

YES_____ If yes, which activities and why?

12. Are you learning as much as you think you should be learning in the course?

    Yes_____

    No_____ If no, what else do you think you should be learning?

13. What are the strengths and weaknesses of the teacher and the course?

14. Please indicate ways in which the instructor could improve the course or his/her teaching.

15. Any additional comments.

SUMMER RESEARCH APPRENTICESHIP PROGRAM 1980

STUDENT PROGRAM ASSESSMENT

Dear Student:

We would greatly appreciate your comments about the effectiveness of this summer's program. Please comment on each of the areas given below, but feel free to express any other thoughts on any areas not included. Please do not write your name on this evaluation form, but check the appropriate box to identify your class.

Class A [ ] Class B [ ]

1. Academic Emphasis:

   Was the importance of academic improvement and excellence sufficiently stressed? Overly Stressed?

2. Curriculum:

   a. Did you find the courses offered appropriate? YES_____ NO_____
      Please explain.

   b. Did the courses meet your needs? YES_____ NO_____

   c. Could you have benefited from different courses? If so, please state:

3. Activities (field trips, films, yoga)

   a. Were there enough activities? Too many?

3. Activities (field trips, films, yoga cont'd)

   b. Which activities did you like the most?

   c. Which activities did you like the least?

   d. What activities should be considered for next year?

4. General:

   a. Would you recommend this program to another student like yourself?
      YES _____ NO_____ Please explain:

   b. Would you be interested in coming to the program next summer? YES____ NO____
      Please explain:

5. Year-round Program:
   During the school year, we plan on having a program after school or on some weekends.

   a. Would you be interested in attending?

   b. What kinds of activities would appeal to you the most?
      (Check the appropriate box)

	YES	NO
Tutoring in your school subjects	☐	☐
Field trips	☐	☐
Yoga	☐	☐

Other (please state_____)

SUMMER RESEARCH APPRENTICESHIP PROGRAM

Summer 1980

Dear Teacher:

The following information will be used for monitoring students' progress in the Summer Program and for providing staff with the background information necessary for effective counseling. In addition to addressing the areas indicated below, please feel free to add any information or comments that might be useful in these regards. Use extra paper if necessary. RETURN BY AUGUST 4, 1980.

STUDENT _____ COURSE _____

INSTRUCTOR _____ PRE ASSESSMENT SCORE _____ DATE _____

ABSENCES _____ TARDIES _____ POST ASSESSMENT SCORE _____ DATE _____

1. Did the student have any important strengths or weaknesses in the subject area? Please specify.

2. Did the student appear interested in and motivated to learn the subject? If no, why not?

3. Did the student participate in class? If no, why not?

4. Were assignments completed by the student? (Please attach a sample of student's work)

5. Did the student exhibit any major behavioral problems?

6. What are the student's outside interests?

7. Were there any significant changes in the student's interest in the subject or participation in class work? Please specify.

8. Has the student demonstrated a willingness to improve within the subject area?

9. What is your assessment of the quality of the student's academic work and progress?

10. What are the student's plans for the future, i.e., career, education?

DATE_____

SUMMER RESEARCH APPRENTICESHIP PROGRAM, 1980

TEACHER PROGRAM ASSESSMENT

To All Teachers:

We would greatly appreciate your comments about the effectiveness and processes of this summer's program. Please comment on each of the areas specified below but feel free to express any other thoughts not included, and indicate any areas in which you would like improvement or change. Please outline your responses below and bring this assessment form with you to the evaluation program on Monday, August 4th, at the school of Social Work (UCB) at 9:00 a.m. Thank you.

1. Academic Emphasis:
   Was the importance of academic improvement and excellence sufficiently stressed? Overly stressed? How did the students feel about this emphasis?

2. Class Scheduling :
   Were the students generally placed in appropriate levels? If not, how could this be better accomplished? Were the classes long enough? Too long? Was there enough time between classes? What problems seemed peculiar to the afternoon classes? To the morning classes? Were the classes too large or too small?

3. Administration:
   Was the Program effectively administered? Did you find it a help or hindrance? Did you feel comfortable expressing your feelings and problems? Was there adequate opportunity for communication for you and for students?

4. Attendance:
   Were the attendance policies fair? Would you have wanted more or fewer rules or more enforcement from the director? Was poor attendance a serious problem? Was tardiness a serious problem? If yes, how could this be improved?

5. Sports/Activities/Group Counseling:
   Did the activities meet students' desires? Were there enough activities? Too many? Were students interested in the offered activities? What activities should be considered for next year?

6. Students' Attitudes:
   How did they feel about the goals of the program, classes, and activities? Did they seem to feel they were benefiting from their participation?

7. Curriculum:
   Were the courses offered appropriate for the students? Did they meet their needs? Could they have benefited more from different courses? Were students aware of the focus of the courses?

8. Staff Perceptions/Issues
   a. Do you think the program had specific and clearly stated objectives? If so, were they realistic? Not realistic? What do you think should be included as realistic objectives for a six-week summer program?

   b. Would you like more general staff meetings? Were staff meetings helpful? Were the duties of staff members well enough defined? What would be the best way to increase communication between staff members?

9. Office Procedures:
   Were you able to get the office help and supplies you needed? Were your orders (for books/supplies) followed through? Did you get the help you needed for planning trips/activities, i.e., tickets, purchase orders? Could the procedures be improved.

10. Class interruptions:
    Were there too many interruptions? Do you feel they were necessary?

11. Evaluation:
    a. Do you feel the over-all evaluation was effectively administered? Was it objective? Were assessments clearly explained and/or beneficial?

    b. Did you feel uncomfortable being evaluated by the students? Were students generally objective in their responses?