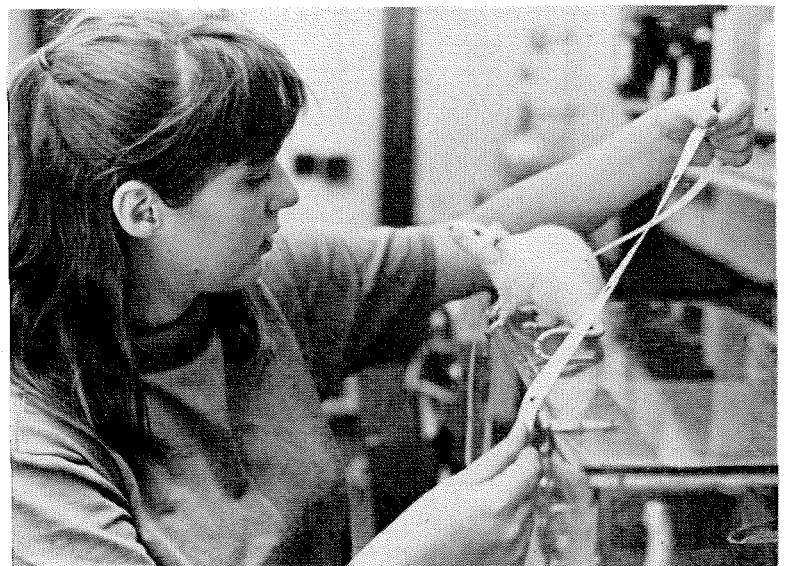


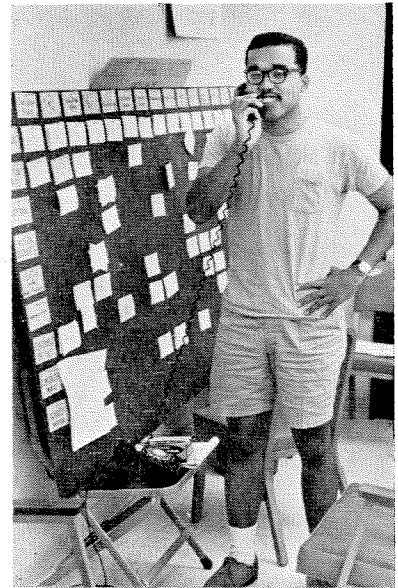
Undergraduate scientists and social scientists combined forces and goals in the many-faceted project. One group of students ran and tabulated a 10,000-piece mail survey to estimate the amount of property damage caused by smog. Others tested the effects of metals in smog on mice, the effects of a heavy ozone environment on rats, and the effects of a smog-free environment on rabbits.



The Student Smog Research Project

by Barry Lieberman '68

*Caltech undergraduates and students from other campuses
launch an ambitious educational experiment*



Spearhead of the project, student body president Joe Rhodes.

The ASCIT (Associated Students of the California Institute of Technology) Research Project on Air Pollution did not originate because Caltech students felt a great desire to help alleviate the smog problem. Students chose the topic only after they kicked around the idea of a research project in the abstract. The project was envisioned as a unique expression of student activism consistent with Caltech.

Caltech students were concerned about the same issues that bothered students on other campuses. Many did not like the Vietnam war, and they did not want to be drafted because of it. Many worried about the terrible effects of racism and saw Pasadena's ghetto as a constant close reminder. Many experimented with drugs, and a small minority used them heavily. And finally, many expressed discontent with the Caltech educational experience.

Student anxiety, however, never came close to the point of forcing the type of open, disorderly confrontation that has plagued other universities.

The only organized presentation of student grievances at Caltech came at a meeting of the student body in the spring of 1967. At that meeting students passed a number of resolutions asking for liberalization of the curriculum, increased voice in Institute decision-making through membership on faculty committees, and establishment of study committees to explore various areas of the undergraduate pro-

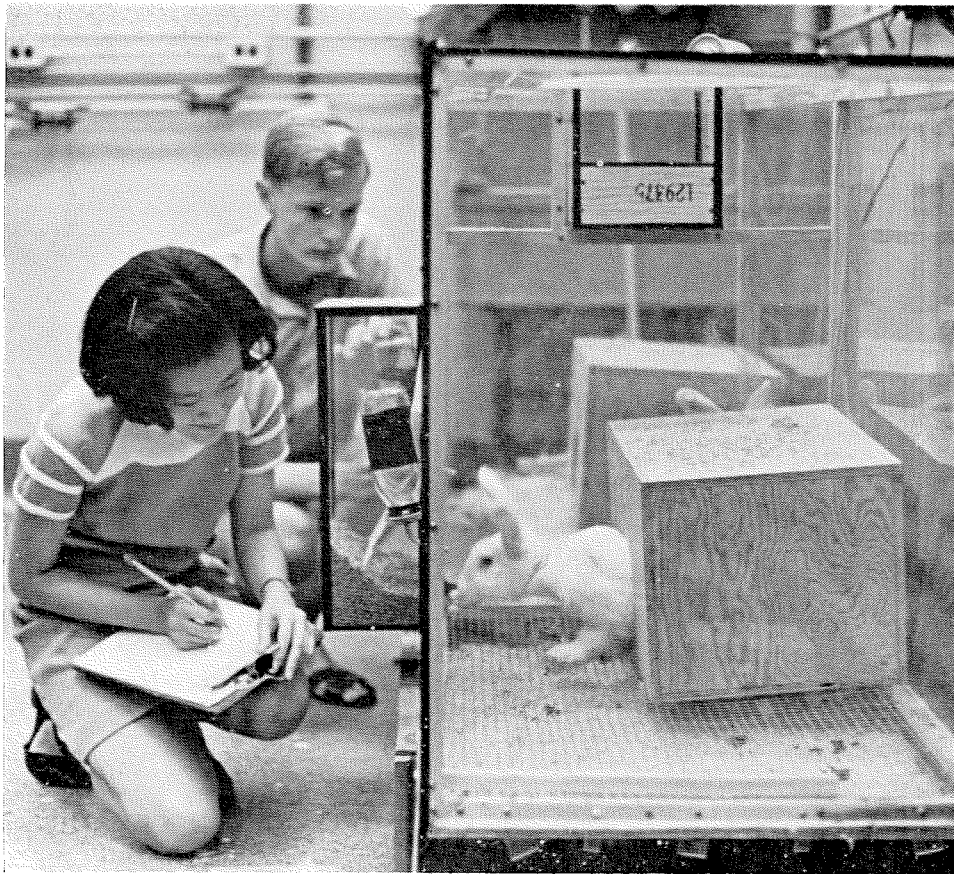
gram. The faculty greeted these requests favorably, and steps were taken to implement some of the student proposals. But student body president Joe Rhodes, '69, saw that a research project could penetrate far beyond small academic changes, and he convinced other students to take the initiative to set up an alternative educational structure alongside the conventional one.

Committees formed when school reconvened in the fall of 1967. They faced the task of picking a research topic, articulating the goals of the project, attracting other workers, and filling in the details. This is when the hard work began.

At an early meeting students chose air pollution as the research topic because it was a crucial, local problem with both social and technical aspects. The project members were unrealistic about the contribution they could make toward solving the pollution problem. They showed little appreciation or understanding of the great amount of work the Los Angeles County Air Pollution Control District and others had already done. But at the same time project members brought freshness and enthusiasm to the problem. Since they started out knowing nothing, they were not prejudiced by old concepts.

Beneath the first musings over air pollution, the social and educational project goals began to become clearer in the minds of the creators:

► Give undergraduates a chance to do research



Project workers compare blood samples of rabbits in smog-free and smog-filled chambers. Results show that rabbits breathing smog have 25 percent more lead in their blood.

about real problems instead of just textbook problems.

- ▶ Rekindle the enthusiasm of Caltech students by giving them the chance to become involved in something which they themselves formulate.
- ▶ Expose Caltech students to social science and to social science students from other schools.
- ▶ Expose social science students to the natural sciences and to Caltech students.
- ▶ Introduce women to the Caltech campus.
- ▶ Devise a social community oriented toward the completion of an intellectual task, but also a community where the emotional interactions between people are dealt with consciously and openly—this to be accomplished through the use of basic encounter group methods.
- ▶ Demonstrate that the behavior of American college students is motivated by a deep concern for this nation and the world.
- ▶ Challenge the image of Caltech as an ivory tower by actively demonstrating how the resources of an academic institution can be put to work on social and community problems.

In November 1967, with research topic and rev-

olutionary goals clearly in mind, project members began to assemble proposals aimed at raising money to finance the project.

At about the same time the faculty decided to keep its eye on the project, both to advise the students and to make sure they did not commit Caltech officially to anything. The faculty board appointed an ad hoc committee to investigate the research project, and the board voted, on December 15, to approve the project and “encourage the student body to proceed with their proposals.”

Bad news followed this good news only one week later. The first formal request for funds—\$33,000—was turned down by a California foundation.

Discouragement reduced project activity to its all-time low. Students who had worked from the beginning became disillusioned and quit. In attempting to obtain funds, the project had developed into a bureaucracy which did not appear to be making headway toward organizing around air pollution research. Many serious students who did not empathize with the educational goals refused to have anything to do with the project as long as research was secondary.

At the end of the tunnel, however, there was a dim light. In March, Joe Rhodes went to see S. Smith Griswold of the Department of Health, Education, and Welfare's Air Pollution Center in Washington. Griswold was impressed by the preliminary efforts and stopped at Caltech during a trip to the West Coast. He indicated that funds were available and that he thought the project could make a contribution to air pollution studies. He advised the students to rework their proposal and suggested areas of research to pursue.

Project members finally got down to the business of writing a serious research document. The final 88-page product asked for \$68,000 to fund about 60 student researchers. It included the following areas of proposed investigation:

- ▶ Assess the domestic pollution cost by sampling consumer household expenditures in a polluted and non-polluted community.
- ▶ Assess the public concern by sampling opinion in a polluted and non-polluted community.
- ▶ Study the roles of government and pressure groups in pollution legislation.
- ▶ Study the feasibility of implementing wide-

scale, computer-arranged car pools.

- ▶ Attempt to improve the photochemical model of atmospheric smog.
- ▶ Study the affects of atmospheric lead on living things.
- ▶ Study the costs and effects of various control measures.

In May the proposal was mailed to Washington. Everyone waited impatiently. Students from other universities, some in the East, were set to come to Pasadena if the project received funding. Many could not hold up their summer plans beyond the first of June. On June 6 the project learned it had gotten the money.

The planners had until June 24, the official starting date, to devise a structure for the summer. Little attention had been paid to summer organization because project members had channeled all their efforts into obtaining funds. On June 24 about 45 new participants would arrive. Many of them only knew that the project would study air pollution.

Fortunately the project got help from TRW Systems in Redondo Beach. TRW had trained some of its professional systems staff in basic encounter tech-



A girls' dormitory was set up in Blacker House for female project workers this summer. Some of the 25 girls came from as far away as Wellesley, Pembroke, Swarthmore, Carnegie-Mellon, and Radcliffe.

niques as a means of helping project teams within the company to run smoothly. Discussions with members of the TRW staff produced a number of goals and concrete proposals for organization of the Caltech research project:

- ▶ The project decision-making structure should be completely democratic. Every project member should clearly understand the organization and how he could affect it.
- ▶ The participants should not consider project work a nine-to-five summer job, but instead something that could produce great personal commitment, dedication, and involvement.
- ▶ Project members should be completely free to choose the type of work they would do.
- ▶ A clear framework should exist to allow project members to air any form of dissatisfaction, including problems of personal relationships. These problems should be dealt with immediately, before they could interfere with the work that had to be done.
- ▶ The project's organization should not be rigid; there should be constant reevaluation and, if necessary, modification of the organizational structure.

Following an intensive orientation week the project began operation within a structure that placed just about all activity within two types of groups—a task group and a family group. The task groups were the work groups, and there was one for each area of research. The family groups met as basic encounter groups, providing a place where problems could be discussed. Membership in family groups cut across task-group lines in an attempt to provide maximum mixing and communication.

The value of the project in teaching participants how to do research became apparent as the task groups grappled with the problem of defining and then attacking their work. Task groups at first had great trouble getting beyond a vague statement of their work (i.e., "We are going to study the working of the government as related to pollution legislation" or "We are going to survey the public's attitudes toward air pollution"). From these abstract statements, groups had to formulate day-to-day tasks and plan the work for a 12-week time limit. Planning like this, however, was almost impossible without some intuitive understanding of the research problems. Such intuition comes from an exhaustive prerequisite understanding of the subject, plus experience. Project members lacked both, and

thus faced the additional problem of becoming experts in a few short weeks. This prevented some groups from establishing a definite plan of attack until late into the summer. The groups that faced this problem remained on the verge of panic, worrying about whether their efforts would ever produce any results.

The task group-family group arrangement turned out to be only a partial success. Instead of working out personal antagonisms within the family groups or with the person involved, many project members confided in intermediaries and personal friends.

The project's group approach to research also had some shortcomings. Some people worked better independently and a few project members showed little initiative and needed even *more* direction than the group could provide. Even so, the open-ended, flexible atmosphere of the research project was far more successful in inspiring creativity and productivity than the rigid atmosphere of the classroom.

The one unqualified project success was its role in bringing 25 undergraduate women to campus. The scarcity of girls before the project, other than secretarial staff, made it easy for such a small number to have a great impact.

The research project did not produce any earth-shaking results, but no one really expected it to. It did, however, do some honest research, and a report of that research will be published by the end of the year. More important, the project attempted to practice the goals that it preached. That made it not only a means to an end, but an end in itself.

The project has a number of immediate implications for Caltech:

The faculty and students should continue to explore ways of reforming the academic program. New liberalizations, especially student-initiated projects, should be encouraged.

Caltech should seriously pursue development in areas other than the natural sciences. The project was consistent and anticipated all the directions in which Caltech has said it hopes to head.

The admission of women should be pursued with all due haste.

The project had shortcomings and limitations. It was student protest that saw an alternative and attempted to experiment with it. It is therefore essential that the experiment be analyzed in terms of what it proved and what it failed to prove. Only then can the results be applied and have lasting value.