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REPORT

UNDERGRADUATE RESEARCH PARTICIPATION PROGRAM

at

Colorado State University

Summer 1960

Submitted to
National Science Foundation

By
James R. Barton
Director

Civil Engineering Section
Colorado State University
Fort Collins, Colorado

ENGINEERING RESEARCH

AUG 17 '71

FOOTHILLS READING ROOM

October, 1960

CER60JRB61

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Summary:

The Undergraduate Research Participation program in engineering at Colorado State University for the summer of 1960 supported five students in three different departments, Agricultural Engineering (1), Civil Engineering (3) and Mechanical Engineering (1). Each student did a creditable job and each seemed to benefit from his experience with research.

Administrative Organization:

The administrative organization was very simple. The director was responsible for all expenditures and his signature was required before the bookkeeping department would pay any bills for expendable supplies. The grants in aid were disbursed to the students at three intervals during the summer. All arrangements for work done and time spent on the projects were made directly between the student and his supervisor. The director merely checked with the supervisors to see that there was a good relationship between the supervisors and the students.

There was little or no contact between the director and the students, but in each case there was a close relationship between the supervisor and the student. Often daily and at least weekly contact was made between the project supervisor and the student working under him. In most cases a great deal of freedom was given the student to work out his own procedures and methods and the professor acted as a means of guiding the student's work. In the cases where the professor was partially supported under the program, there was generally daily contact with the student and the supervision was more satisfactory than in the cases where no support was given the professor.

Selection of Participants:

In all five cases in Engineering, the participants were selected by the supervisor as a result of his knowledge of their ability and background. This method is a satisfactory one although others may also be used. The lateness of the awarding of the contracts hampered our selection of participants this year. By the time the awards were made, most of our very best students had already committed themselves to a summer job. The fact that we had to choose students in at least two cases with grade point averages for three years under 3.0, taught us an interesting lesson. Both of these students had a cumulative grade point average of less than 2.6 but during the past two quarters both had averaged over 2.6 and both of these students did an excellent job. They showed great initiative, and carried out their projects with a minimum of supervision. Our experience indicates that maybe the grade point average for the year previous to the student's participation in the program coupled with the professor's knowledge of his potentialities may be more significant as a criterion for selection than the student's cumulative grade point average for all his college work.

Tabulation of Participants

No.	Student	Academic Rank during 1959-60	Title of Research Project	Supervisor	Academic Rank and Department
1	Dannie Collins	Sophomore	Design criteria for sugar beet planting mechanisms relating to germination	N. A. Evans	Professor and Head of Agricultural Engineering
2	Paul Wergin	Junior	A study of two phase, single component flow (H ₂ O) in a venturi	Ray V. Smith	Assoc. Prof. Mechanical Engineering
3	John Peterka	Freshman	The rate of freezing of small water droplets as a measure of the impurities in the droplet. A phase of the hail suppression project	Richard A. Schleusener	Assistant Prof. Civil Engineering
4	Dean Skalla	Junior	River cutoffs as a means of flood control	James R. Barton	Assoc. Prof. Civil Engineering
5	Chester Smith	Junior	A study of Colorado bentonites to determine their effectiveness for sealing canals	R. D. Dirmeyer Jr.	Assistant Geological Engineer

Student Accomplishments:

Each student except Collins, wrote up a report for his supervisor. Since Collins was working essentially on the design of the equipment for a research project, a report was not advisable. The work done by each of the other four students enabled them to develop ideas on their own initiative and a research report is planned for each project which will include the contributions made by the undergraduate participants.

Evaluation of Local Program with Recommendations for the Future:

This program was definitely a great asset to every participant. Without exception, they all gained a new appreciation for the problems of scientific research.

The advisers who had the vision of this program were able to do much more with their students than the ones who accepted the student as welcome assistance. Although most of our advisers entered into the true spirit of the program, some were more enthusiastic and more effective than others. From our experience here, it seems reasonable to assume that the student's benefit from this program is directly proportional to the advisor's ability to catch the spirit of the program.

The students who were given small isolated, yet complete, projects to work on seemed to make more progress and derive more

benefit than students who worked on large projects where they were only working on a small phase of the over-all problem.

If the project is short enough, the student can go through the steps of planning the research, doing the experimental work, summarizing the data and results, and actually drawing the conclusions from the result obtained. If the student spends all of his time on any one of the first three steps, he fails to get a full appreciation of research.

Most of our students were essentially independent workers so that they could follow through on ideas which they themselves obtained. This type of freedom for the student is good although he must have some guidance from his adviser.

Our experience here indicates that this NSF program is a very good one and we believe that it will prove to be a real aid in increasing our national supply of research people.

It would be a good thing if this program were publicized on the campus more extensively so that it would be a campus honor to be chosen as a participant.

Where a selection is possible, projects should be chosen that are submitted by professors who are anxious and enthusiastic about getting an undergraduate student to work with. If the professor is really enthusiastic about the project and spends time with the student, the results are bound to be favorable.

Undergraduate Research Participation Program of NSF:

This is an excellent program and should be continued. It is beneficial to students, professors, and to institutions. As far as the program here at Colorado State University is concerned, the following recommendations seem worthwhile.

1. Some money to subsidize advisors of projects is very necessary and should be continued.
2. \$600 for a participant is a bit low in order to attract the truly top grade students in the professional fields.
3. Some of the money used for expendable supplies should be available for more permanent pieces of equipment. This is especially true in the case of projects which otherwise might not need much in the way of expendable supplies.

Financial Report:

A financial report prepared by the University Research Foundation staff will follow this report in the near future. At present it appears that something like \$500 of the contract budget of \$5610 was not spent.