

An Academic Year Extension of a Research Participation Program

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When Mr. Arthur Biederman began his research in 1959 he was a science teacher at Fowler Junior High School in Tigard, Oregon, and head of the Tigard High School District Science Department. He is currently principal of Twality Junior High School.

As secondary school science teachers are actively involved in research they will of necessity become highly informed about their specific investigation and well informed about the general area in which their work is being conducted. Working under the guidance of a research scientist for one or more summers should enable the secondary school teacher to acquire a "feel" for science from a realistic point of view and enable him to convey some of this feeling of science to his students. With an appropriate problem the classroom teacher should be able to continue a phase of this research during the academic year. In many instances, the problem could be of such a nature that secondary school students might be involved as research assistants and take an active part in the study. Thus, the students involved should realize a new appreciation of science. In fact, the research could well have an effect on the entire school from the standpoint of association.

The Development of the RPP-AYE

This is some of the thinking that led to the development of the first Research Participation Program with an Academic Year Extension. Dr. Donald H. Bucklin, University of Wisconsin, working with other faculty

members and some of the participants in the 1958-59 NSF Academic Year Institute, drew up a proposal for such a program and submitted it to the NSF. The proposal was approved as a pilot program for the University of Wisconsin for the summer of 1959 and the school year 1959-60.

Participants in the program received the usual NSF Summer Institute stipend, plus some funds, to the department in which the teacher was to do his research, for the purchase of the necessary equipment. Funds were also granted for the purchase of equipment to be used by the teacher in his investigation during the school year. It was hoped that the school district would match the funds made available to the teacher from the program.

The First Summer

Mr. Ray A. Cook, Brookfield, Wisconsin, High School, and I were accepted into the program to conduct a population study of the thirteen-lined ground squirrel (*Citellus tridecemlineatus*) under the direction of Dr. Joseph J. Hickey of the Department of Forestry and Wildlife Management. We surveyed a ground squirrel population of rural western Dane County, Wisconsin, in relation to soil type, land usage, and crops

raised. We reported our findings at the High School Teachers' Summer Research Colloquium in Madison on August 13, 1959.

Establishing the Research in the Tigard Schools

My interest in the thirteen-lined ground squirrel stemmed from boyhood days when many pleasant hours were spent roaming the countryside of southern Wisconsin. The "gopher" was an interesting animal to observe along the roadsides and in the pastures. This particular spermophile is not found in the far west, so plans were formulated to make use of the golden-mantled ground squirrel (*Citellus lateralis*) which is native to the pine forest areas of the west.

Several initial problems had to be resolved in order to establish the study in the Tigard schools. One of the prime questions was that of the acceptability of this kind of a program by the school district. By the time the correspondence was initiated with Mr. Delbert Fennell, superintendent of the Tigard Schools, it was midsummer and teaching schedules for the 1959-60 school year had been finalized. He was sympathetic toward the program but, because of a crowded building and a full teaching schedule, research time during the school day was not available.

Upon returning to Tigard the end of August 1959, contact was made with Mr. Darwin Shinn, newly appointed principal of Fowler Junior High School, the building in which the study was to be conducted. We toured the remodeled building in search of a location for an animal laboratory in which we could house the ground squirrels. This



Fig. 1. A Golden-Mantled Ground Squirrel *Citellus lateralis* in its laboratory cage.

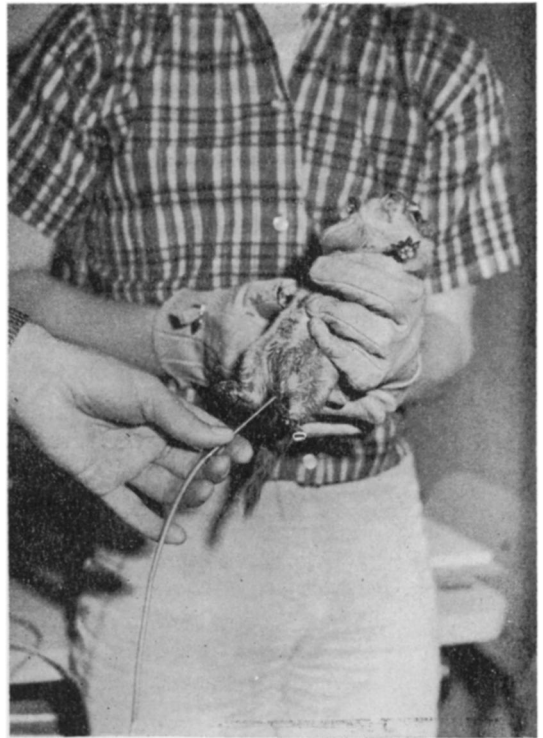


Fig. 2. Rectal temperature of a non-hibernating ground squirrel being recorded. The thermometer is a transistorized electronic one with a thermistor probe.

was a problem of considerable magnitude because the building, which could house a comfortable maximum of 450 students, would have in excess of 600 pupils that year, the year before a new junior high school was to be completed.

The remodeling included a fairly large custodial storage area off the gymnasium and accessible only by way of a folding stairway in the chair storage room. Electricity was available, there were windows for natural light, and there was adequate room. The head custodian, Mr. Harry White, was willing to let part of his newly created facility be used as an animal laboratory.

With permission to conduct the study, and a facility in which to house the research, it was time to check on the availability and trapability of the proposed species. Tigard is some distance from the environment preferred by *C. lateralis*, so a weekend trapping trip was planned. The initial trap site selected was in the Ochoco National Forest near the Crooked River south of Prineville. A day of trapping with eight Havahart No. 1 live traps, on permanent loan from the University

of Wisconsin, netted three chipmunks and no ground squirrels. During the next school week, a phone call was placed to Dr. Kenneth Gordon of Oregon State University, a man who has done considerable work with the golden-mantled ground squirrel. He was able to suggest a promising site near the town of Sisters, on the east slope of the Cascade Mountains. The second weekend, we had a good deal of success in trapping the ground squirrels, which in turn immediately confronted us with yet another problem.

Temporary housing of the ground squirrels in the basement of my home was proving quite trying to my wife and myself, because of the escapability of the animal. A carpenter friend was quickly contacted and contracted to build four batteries of permanent cages. Two batteries contained five cages each and the other two each contained three cages. Funds from the program were used to pay for the construction of the cages.

Proposal Presented to the School Board

With the animals housed in the laboratory, it was time to present information of the new

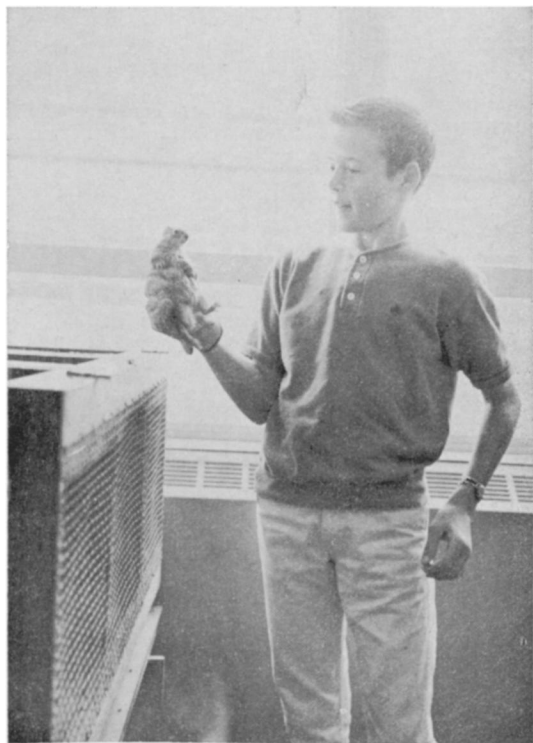


Fig. 3. Student working in the laboratory.

program to the Board of Directors of the Tigard Union High School District. It has been customary in the Tigard Schools for participating teachers to discuss new programs with the School Board, with most of the well planned programs receiving approval. This program was necessarily presented to the board, because funds matching those available from the RPP were to be requested.

The proposal included information pertaining to the history and philosophy of the RPP, the proposed local study, and the request for matching funds. It was proposed that student research assistants meet formally for 1½ hours on Wednesday evenings from 7:00 to 8:30. One-half the time would be devoted to modern topics in biology and the other half to the research itself. Additional time would be spent before and after school hours as well as during noontime. Initially, Saturday mornings would be utilized for the construction of such necessary equipment as nesting boxes, exercise wheels, a maze, and the conversion of refrigerators to hibernation units.

The proposed program was enthusiastically approved.

Selection of Research Assistants

The study was to be a many-faceted one, so several students could be involved. It was decided to accept a maximum of 15 students from the ninth grade, 8 from the eighth grade, and 7 from the seventh, based on achievement test scores, total report card grades for the previous year, teacher recommendations and interviews.

When a list of desirable student participants was completed, a letter explaining the program, the work, and the hours was sent to each one and his parents, with an invitation for them to apply in writing for the position of research assistant. It was made known to the applicants that the English Department would be happy to assist them in the drafting of their letters of application. It was also made quite clear that if selected, the parents would be responsible for the regular and prompt transportation of the assistants to and from the formal Wednesday evening meeting. A total of 28 pupils was accepted as assistants.

Acquisition and Construction of Equipment

Of immediate importance was the construction and purchase of equipment so considerable time was devoted to this during morning, noon, and evening hours as well as Saturdays. The students constructed nesting boxes, exercise wheels, a maze, and converted two refrigerators to hibernation units.

A resident of the community expressed interest in the study and offered a refrigerator to the school for use as a hibernation unit. This initial offer prompted us to explore the possibility of acquiring more material and equipment in this manner. We were given a second refrigerator, feed for two years by the sales manager of a milling company, materials for a maze, sand for "scratching" boxes from the foreman of a bridge construction company, the use of the shop

facilities of a local industry for the construction of any of our equipment, plus many other smaller items.

The Research

Student attendance at the Wednesday evening seminars was excellent. Whenever a participant was ill and would miss the seminar he or one of his parents was to inform me ahead of time; on only one occasion did a student fail to let me know in advance. The voluntary attendance at the Saturday morning construction and maintenance sessions was also very good.

Students worked in teams. One group was responsible for construction and maintenance of equipment; another for feeding the animals; a third group for cleaning; and a fourth for body temperature and weights. Weights and temperatures were recorded weekly.

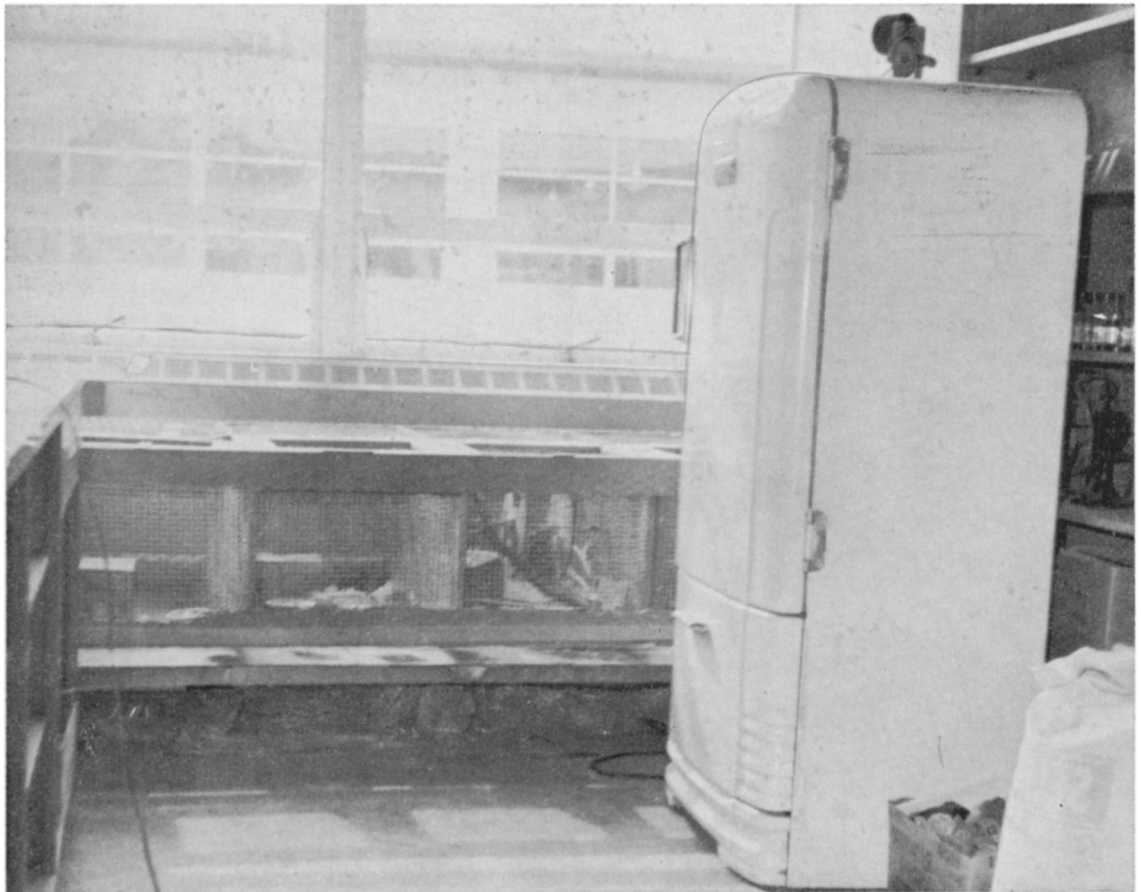


Fig. 4. One of the two animal laboratories. This smaller one contains a battery of five cages and houses ten squirrels. The hibernation unit on the right is a converted refrigerator. Squirrels generally enter hibernation when the temperature drops below 38° F.

Keeping the Parents Informed

When the study was well under way, the principal suggested a meeting with parents to inform them of exactly what was involved in the program. Attendance at this evening meeting was very good. The parents displayed such enthusiasm for the program that it was decided to hold a second meeting in the spring to present a progress report of the study.

The Chicago Meeting

The participants in the University of Wisconsin's Research Participation Program met in Chicago in conjunction with the AAAS Annual Meeting the last week of December 1959. At this meeting the progress of the various research projects in the several schools involved was discussed with a representative of NSF. The acceptance of this type of program by the schools, the value to the participating teachers, students, and classes, as well as the financial support on the part of the school districts was also discussed.

As a result of this meeting the RPP with its AYE was to be continued as a pilot program of the University of Wisconsin for a second year. Later, the NSF made the RPP with its Academic Year Extension available to other colleges, universities and research institutes.

The Progress Report

The Ground Squirrel Progress Report was scheduled for the latter part of May, 1960. During the first part of the program, the research assistants reported on their year's work to parents, faculty, and members of the press. The second part of the evening was a dinner for the assistants, prepared by the parents. Dr. Bucklin was able to schedule a visit to our project at the time of the Progress Report. On Friday he observed the classes, taught a class, discussed the program with the superintendent and the principal, and discussed at some length with the assistants their work and attitudes. The following evening he addressed the students and parents at the conclusion of the dinner.

Subsequent Years

During the 1959-60 academic year a proposal for a seminar class for selected eighth grade students was developed for the 1960-

61 school year and submitted to the Oregon State Department of Education for consideration under the Educationally Able and Gifted Act.

The seminar class was to consist of 15 to 20 students each at Fowler Junior High School and the new junior high, Twality. I was to work with the students in the ground squirrel study three days a week for one class period at one school and two days a week at the other. The next week it was two days at the first school and three at the second. On the days I did not meet with the group, an English teacher worked with the assistants in accelerated reading, literature, and writing. This complemented the research work, because today research involves scanning much scientific literature and communicating what one is investigating. The proposal was approved by the State Department of Education and some funds were made available. In effect, the ground squirrel research was accepted as part of the curriculum of the Tigard Schools and was incorporated into the school day.

Unfortunately, additional administrative and supervisory responsibilities made it impossible for me to participate in a second summer of research at the University of Wisconsin. However, I was continued in the program on a non-subvented basis and thus was able to retain close communication with the program. In addition, informal arrangements were made for Dr. Donald Farner at Washington State University, to act as my local advisor. Contacts with Dr. Farner, Dr. Hickey, and Dr. Bucklin have provided the necessary guidance in continuing our research.

During the 1961-62 and 1962-63 school years the research was continued at Twality Junior High School with assistants from the ninth grade BSCS Yellow Version biology classes which I taught. The research was part of the selected students' laboratory responsibilities for the course.

With continually increasing administrative responsibilities it was necessary to again cut back on my class contact time so for the past two (and concluding) years of the study the students from the eighth grade seminar class acted as assistants, meeting formally for that purpose twice a week.

Accomplishments

The Research Participation Program with its Academic Year Extension has matured considerably since its inception in 1959. It has become well accepted that high school science and mathematics teachers are capable of conducting productive scientific research. This is evidenced by the number of papers that have been presented by members of the RPP at the various scientific meetings and the number of articles published. The acceptance of secondary school students as contributors to the research is also gratifying.

In Tigard, the program has been accepted by the community and by the school district. Funds for the study, for material, and equip-

ment are included as part of the regular school budget with items being listed under the NDEA and EAG accounts where applicable. The school district has contributed financial assistance for trips to meetings throughout North America when such meetings related to the research program.

Most important, the teacher has found that he is capable of doing scientific research and that the selected student can measurably contribute to this research. Thus, a whole new appreciation and respect for science is developed by the teacher, his assistants, his classes, and often, by the entire school and community.

Science Achievers

What are the characteristics of Negro and Puerto Rican students in New York City high schools who do well in science? The high-achievers in science usually have an active interest in science and receive strong parental encouragement. They come from homes where there is a large number of books and magazines and where they have a place conducive to study. They have a high self-estimate in terms of ability in science and their general ability and responsibility. And, generally, they do well in other academic areas.

Dr. Morsley G. Giddings of Teachers College noted that he attempted to identify the factors that might be associated with the varying levels of science achievement among the Negro and Puerto Rican students who were all of relatively high intellectual ability.

Among the differences between high and low achievers as groups were:

1. Tardiness and absence at school. For 1962-63 highs were absent 8.5 days and late 1.2 times; lows were absent 17.16 days and late 6 times.
2. Number of infractions of school regulations: Highs had 42 infractions; lows had 116.
3. Suitable place to study: 11 highs had such a place; 2 lows.
4. Number of hours spent in preparing homework assignments: Highs spent 162 hrs./week; lows spent 84 hrs./week.

5. Extra curricular activities: 12 highs participated (academic clubs etc.); versus 2 lows.
6. Achievements in other academic subject areas: On standardized and city-wide tests, high achievers scored higher than low achievers in all areas: math, 82.33 vs. 60.66; Social Studies, 85 versus 74; English 84 vs. 76.13; Foreign Languages 83.53 vs. 76.33.
7. Size of family living at home: Highs as a group had 3.66 persons in family; the lows had 8.0 persons.

Family Communications and Disturbed Adolescents

Teenagers are continually complaining that their parents don't understand them. At the Michael Reese Hospital in Chicago, a group of psychiatrists listened more closely, however, when they heard this complaint again and again from young people undergoing psychiatric treatment.

Based on subsequent studies of 20 families, the investigators conclude that there may be something to youngsters' complaints.

Good communication within the family seems to be a major factor in helping the teenager adjust to his problems and in meeting the goals his parents set for him. Conversely, it is poor communication that seems to increase the anxieties of disturbed adolescents. Carried to extremes, these breakdowns in family communications may result in the need for psychiatric help.