

Use of the Project Method in Advanced Courses in Zoology

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We college teachers are missing a bet. Every one of us has probably been amazed at the High School Science Fairs, if not at a Four-H Club or Boy Scout exhibit, when we see the quality of some of the exhibits and ponder upon the effort and ingenuity which they represent. The interest, enthusiasm, and careful study which the projects involve are less obvious, perhaps, but are of even greater importance from the standpoint of education. These students are learning by doing—and they like it.

Let us compare this sort of learning with our standard college and university methods. For the most part, we teach science, whether biological or physical, by the time-honored combination of lectures and laboratory. When well planned and well executed, they serve adequately in our teaching, but the student seldom has much leeway for original thinking or mental exploring. The laboratory exercises are carefully designed so that each student should make the same observations and draw the same conclusions. We are leading the students on a carefully-organized conducted tour through the halls of learning. This is the most efficient means we have devised for giving them all the same "education."

But where is the challenge, the urge to explore? We are methodically suppressing it—perhaps eradicating it. If we hope to turn our scientists who are really interested in research, who will probe the frontiers of knowledge, we need to stimulate students—to let them get the "feel" of discovery. No matter how efficient our course organization, how good our lectures, how well-equipped or well-supervised our laboratories, we are missing a bet if our students never experience the exhilaration of discovering things. This is a major incentive to further research, and yet almost the only place in our curriculum for exposing students to such experience is in our graduate program, with research for theses and dissertations. How many of our promising students fail to get that far? Can we blame them for turning aside—into medicine or some other field in which the rewards may be manifest? If they are to feel the thrill of research, and to become productive scientists, the critical period for reaching them is during their college training, or even earlier.

The writer claims no originality in attempting to acquaint students with the joys and rewards of research by having them try it. Undoubtedly there are many others who have experimented with the method, who, like the writer, have observed no awe-inspiring list of accomplishments achieved by their students. However, the method has merit, and can be very effective in stimulating all concerned. (The teacher can often profit by a bit of stimulation, too.) Perhaps the project method has been most widely and effectively employed in such courses as Nature Study, inasmuch as the twenty-fourth edition of Anna B. Comstock's "Handbook of Nature-Study" was published in 1939, twenty-eight years after the publication of the first edition—almost a new edition a year. Incidentally, this book is recommended to every science teacher, especially to those who teach biology, regardless of the level of the students.

The writer first tried the use of projects in an introductory zoology course at the University of Idaho in 1945 or 1946. The projects were to be ecological reports, prepared jointly by all the students at a laboratory table, which amounted to teams of eight. The reports provided a little variety and a bit of fun, but involved virtually no real research. At the University of Oklahoma, the writer has not utilized the method in introductory courses, but has employed it in most of his advanced courses, including Field Entomology, Natural History of the Invertebrates, and Protozoology. It has

not, of course, been an unqualified success. Some students are poorly qualified for research, and probably always will be. Some, regardless of ability, are frightened at the prospect of having to do something original. Others are alarmed at the thought of having to write up and present the report. Despite such misgivings and reluctance on the part of certain students, most of those who undergo the ordeal experience something of the fascination of research, and find the effort most rewarding. If nothing more, the student usually gains a little appreciation and understanding of the scientist.

Some of the problems (projects) have resulted in papers presented before the Oklahoma Academy of Science (2, 3). At least one has been continued as a Master's Thesis problem (4). Even such eventualities as these do not assure continuation in research, of course, nor should they. It is the first taste of research for practically every one of the students; we may expect it to be the last taste for those not interested, but they have at least had the taste, and most students seem to enjoy either the taste or the aftertaste.

In advanced courses, individual problems have been more successful than group problems. For the most part, the writer has allowed students a free hand in selecting problems. This has psychological advantages from the standpoint of interest and enthusiasm, but it certainly has disadvantages in practice. In general, the beginner is likely to bite off more than he can chew in selecting too broad a problem for the time and facilities available. However, this itself provides valuable experience for those who go on into graduate work.

This past summer, for the first time, the writer *assigned* problems. The course involved was Natural History of the Invertebrates, in which there were enrolled only five students, of whom three were high school teachers and another about to become one. Each was to make an ecological study of a 100-square-foot plot along the shore of a pond located on the campus. The plot was to be either rectangular or square, preferably the latter, and was to be carefully mapped at the outset. Each student was free to choose his plot site. The plot sites turned out to be quite diverse in character. Although most of the reports were disappointing from the standpoint of research, this aspect of the course will, in the long run, very likely prove to have been the most beneficial and stimulating, despite the fact that it represented but a minor portion of the laboratory work in the course.

In summary, it is believed that research problems are feasible at the undergraduate level in science courses, and that they constitute an effective means of arousing both enthusiasm and intellectual curiosity. Furthermore, there can be fun for all concerned.

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