Instruction for Extension Service Personnel in the Philosophy and Interpretation of Agricultural Research

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IT HAS been my privilege to design and teach a course with the objective of giving students a better understanding of agricultural research. Nearly all of the students are full-time employees of the Auburn University Agricultural Extension Service. They are graduate students in the Master of Agriculture program. Having mature students in class who have experienced a need for the information that the course title promises has been a pleasure, indeed.

The courses required for the degree of Master of Agriculture are offered at five centers geographically located so as to minimize travel distances for personnel located in the counties. Classes of four hours duration are held once a week in the evening. Three, quarter hours of credit are given for successful completion of each course.

Most extension workers in Alabama have had no training or experience in scientific research. A basic premise for this course is that the students can more effectively explain and disseminate the results of agricultural research if they understand the principles of scientific research. Accordingly, this instruction is required for all students in the Master of Agriculture program.

At the sacrifice of some accuracy, the language used in the course is usually limited to that which is familiar to most of the students. They are told that this will be done and that this inevitably means some truth is lost in the simplification. Since it is necessary to introduce some new terminology, some definitions are required. This is avoided, when possible, by giving descriptions and examples.

The introductory material describes the activities of science and differentiates between scientific and nonscientific research. The differences and similarities among scientific research, testing, and demonstrations are described. Student experience with the latter is utilized.

Scientists often feel that the public appreciates practical research but has little appreciation for basic research. It was anticipated that it would be necessary to "sell" the students on the importance of pure science. Such was not the case. While not too familiar with the activities of basic research, they had through some means learned to appreciate its importance in the advancement of science.

The students were universally surprised that "the language of science is mathematics," and that advanced science could not exist without both mathematics and technical language. Examples are given of how a table, graph, or summary of a technical article that contains no mathematical symbols (other than numbers) can be put in mathematical form. The students were amazed with the statement; "one of our major weaknesses in science is that our language is not technical enough for the scientist to appreciate its simplicity as well as the ease with which he can "walk" the student through the operations in experimental research.

1. Observation
2. Hypothesis
3. Experimentation
4. Interpretation

Observation—The students are led into thinking of observation as used in the scientific method. At this point an attempt is made to give them a visual picture of what a scientist relies not only on his own observations but also on those of his colleagues. Published works are described, being the most important source of observation. The scientist can neglect at the peril of his career.

A description is given of general steps in the literature beginning with general references, such as encyclopedias and elementary texts. Progressively the student goes to more specific references, such as the latest technical journals. The necessity for the last and most specific, the review of the latest technical journals, is described in some detail. A common misconception among students is that the latest information is found in the newest books.

Synthesis of observations—The student is informed that since conflicting observations are often found in the literature, a major test of the scientist's competence is his ability to evaluate the literature. If his work is nonvalid, regardless of the success of the work, he can also be expected to be non-valid and thus wasteful of resources.

It is pointed out that by some reasoning, we don't fully understand, the scientist's ability to make valid observations from all sources and comes under which his research will be designed.

Hypothesis—The lecture on this subject continues along this line. The hypothesis is the idea for the project, that the investigator thinks will happen under a given set of circumstances. While outstanding ability or even genius is often exhibited in any part of the scientific method, it is not often exhibited in the idea for the project.

At this point a description is given of some of the characteristics a scientist should have. It is stressed that good characteristics are desirable, but he must have imagination. Without imagination a person can hardly make important contributions in many fields of endeavor.