SCIENTIFIC COMMUNICATION

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One of the criticisms heard about the inadequacies of today's college graduates is that they lack the skills for effective communication. Most everyone, in any discipline, has room for improvement in writing and speaking. Inadequate communication is not new...we can trace this criticism back through the elementary and secondary schools, and back through the centuries. Historically, the communication of scientific discoveries, new concepts and theories have been transmitted to the scientific and lay communities rather slowly. The acceptance of new ideas by scientists has not always been swift and universal.

The exchange of scientific knowledge in the past has been slow due in part to the methods of transmission and the reluctance of investigators to report and publish their findings. Sir Issac Newton, for example, was reluctant to report his findings on planetary motion and did so only after the urging of Sir Edmund Halley.

According to Conant (1951), before the existence of scientific journals, information about scientific discoveries spread by letter. Occasionally an investigator would publish a book in which he recounted his work. The pioneer work of Ignaz Philipp Semmelweis in asepsis and the reduction of the incidence of puerperal fever was not immediately accepted by doctors, but once they became aware of the importance of washing their hands and sterilizing their instruments, the mortality rate dropped for the disease (Gardner 1972). Then too, the work of the Czechoslovakian monk Gregor Mendel laid the foundation for the science of genetics. Mendel's work lay undiscovered for nearly forty years, but according to Gardner (1972) it was in 1900 that Mendel's paper was discovered by Hugo de Vries, Carl Correns and Erich von Tschermak-Seysenegg, who recognized the significance of Mendel's work and brought it into prominence.

Perhaps most of our students are not at the point where they will make contributions similar to great people like, Newton, Halley, Semmelweis and Mendel, but it is necessary that they be involved pragmatically with the fundamentals of scientific communication. It would be reasonable to expect that a student who entered a degree program in biology would be more effective in written and oral communication at the time of his/her graduation than when he/she first began college four or five years earlier. He/she should be effective in communicating ideas, concepts and processes of thought with his colleagues and with members of society in general. Ideas, concepts and methods of scientific inquiry are fundamental outcomes of study in the sciences. As Gardner (1972) has stated: "There can be no effective 'science' until there is effective, lasting communication of information. This truism holds for biology as for all science".

The Department of Biology in Kearney State College has recognized the importance of effective communication and requires a course in scientific communication for students majoring in biology. The course carries one semester hour of credit. The required text is How to Write and Publish a Scientific Paper, by Robert A. Day (1983). A supplementary text is the CBE Style Manual, fifth edition, Council of Biology Editors, Inc., (1983).

The objectives for the course are as follows: To be able to:

1. Develop a rationale for writing and speaking well, in the communication of
scientific information.

2. Use the guidelines for formulating a research proposal, effectively.

3. Demonstrate a capability to use library research resources such as journals, abstracts, indexes, government documents and computer search facilities.

4. Prepare an acceptable research paper in keeping with the approved style and form of the CBE Style Manual.

5. Present oral reports of scientific research in an acceptable manner.

6. Demonstrate a high degree of competency in the use of the English language.

As the objectives imply the student has ample opportunity to develop skills in searching the literature, present oral and written work, and become adept in using library materials. Some examples of assignments which are intended to accomplish the objectives are:

1. A lecture, presentation with slides and a discussion of scientific method.

2. A library tour for explanation of the use of journals, Biological Abstracts, Chemical Abstracts, indexes, government documents, science dictionaries and references, ERIC (microforms), the card catalog, and the computer search DIALOG.

3. A term paper requirement - the term paper is a review of the literature in an area of biological research of interest to the student. The literature review and citation are written in acceptable form according to the CBE Style Manual. The paper must use a minimum of 20 scientific literature sources and probably will be between 10 to 15 pages in length. A two-hour research project is required for biology majors and a student may well use the term paper as a review of the literature for the research report.

4. Establish the differences between an abstract and a summary and develop reference cards with abstracts and proper citation of the research sources.

5. Small group oral reports in which assigned research reports are critically evaluated against selected criteria.

6. Lecture, discussion and accompanying handouts are used to illustrate proper writing form, citation form and the development of the research report.

7. Three films are shown which present field or laboratory research. The student then writes a 200 word paper summarizing the "research message" found in each film.

8. Scientific vocabulary exercises, involving word definition, prefixes, suffixes and confusing terms, are assigned.

9. Readings are assigned from Day and the CBE Style Manual.

10. A grade for the course is based on the evaluation of all assignments, a term paper and two tests.

Admittedly there is a considerable amount of work in the course for one-hour of credit. However, the response to the course has been very favorable. Comments on evaluations indicate that most students had not been required to write research papers to any great extent prior to taking the class. They recommended that more credit should be assigned to the course, but they did feel more comfortable in reviewing research literature and writing reports and proposals for investigations after having completed the course. There is validity to the saying that one of the best ways to learn to write well, is to write and write and write!
LITERATURE CITED


Conant, J.B. Science and common sense. New Haven, CT: Yale University Press; 1951.
