♦ A Curriculum for Biomedical Writing and Editing: A Second Volley

Courses for Biomedical Writers and Editors

Core Courses

1. An Overview of Biomedical Research and Publications

- Epistemology and philosophy of science and its alternatives
- The scientific method: biomedical research terms and concepts
- Practices and ethical principles of animal, pharmaceutical, and clinical research
- The drug-development process
- The scientific literature: journalology
- Types of biomedical communication and publication
- Authorship, falsification, fraud, and plagiarism
- Evidence-based medicine

2. Medical Editing

- Review of grammar, syntax, and punctuation
- Review of sentence and paragraph structures
- Medical terminology, nomenclature, and discourse
- Marking a manuscript, editing and proofreading techniques, and queries
- Style manuals and electronic information sources
- Submitting a manuscript (guidelines for authors, Uniform Requirements, the CONSORT statement)
- The author-editor relationship
- The working environment: editorial offices and writing groups

3. Reporting Statistics in Medicine

- Data and descriptive statistics
- Hypothesis tests, P values, and confidence intervals
- Association, correlation, and linear-regression analyses
- Multiple regression and analysis of variance
- Survival analysis and concepts of epidemiology
- Diagnostic tests
- Economic evaluations and pharmacoeconomic studies
- Meta-analysis and decision analysis

4. Data and Visual Displays

- Principles of visual perception and Gestalt perceptual psychology
- Basic tables
- Specialized tables and their interpretation
- Basic charts and graphs
- Specialized charts and graphs and their interpretation
- Medical illustrations, posters, slides, displays, and overhead transparencies
- Photographs and medical images (handling, cropping, highlighting)
- Intellectual property and copyright law

5. Communication Theory and Research

- Forms of communication (interpersonal, mass, computer-assisted)
- Classical rhetorical theory (argument, persuasion, exposition)
- Diffusion of innovations and marketing communication
- Research into written communication
- Psychology of meaning-making and interpretation
- Effect of communication media on messages
- Organizational communication
- Evaluating written communication (protocol analysis, focus groups, surveys, and so on)

6. Medical Writing

- Data-collection techniques (interviewing, Internet, libraries)
- Audience analysis
- Techniques of writing
- Collaborative writing
- Writing original research articles: the IMRAD format
- Writing review articles, case reports, and chapters
- Writing feature and news articles
- Writing patient-education materials

7. Publication Design and Production

- Principles of graphic design
- Principles of publication design
- Principles of typography, paper selection, and color
- Introduction to desktop publishing
- Introduction to printing technologies
- Introduction to online and multimedia publishing
- Preparing production schedules and budgets
- Project management

Elective Courses

Writing Theory-based Patient-Education Materials
Pharmaceutical Marketing and Physician Education
Publishing Biomedical Journals
Medical Journalism and Science Writing
Public Relations for Hospitals and Research Institutes (Unique Issues of)
Biomedical Book Publishing
Freelancing as a Career
Online and Multimedia Publishing
Overview of Pharmaceutical and Regulatory Law and Documentation
Writing INDs (Investigational New Drugs) and NDAs (New Drug Applications)
Project and Personnel Management

In a recent issue of CBE Views, Susan Eastwood began "the first volley in a match to define an optimal curriculum for biomedical manuscript editors" (1). Having given this topic considerable thought over the years myself, and having known Susan even longer, I was surprised by the number and nature of the differences between her thinking and mine.

For example, although the concept may be implied, the word "communication" does not appear in her curriculum. Also, I am at a loss to distinguish content differences between "introductory" and "advanced" courses on abstracts, references and principles of attribution, editorial technique, and proofreading. In addition, a number of courses, such as the 6 years of recommended language courses (at least 1 year of Greek, 1 of Latin, 2 of a modern Romance language, and 2 of a non-Romance language), seem to me unnecessary, however personally satisfying they may be.

On the other hand, I think that her curriculum includes many worthwhile topics, including most of the important ones. It's just that I judge many topics to be more peripheral to the profession than central to it. So, in the spirit of continuing the volley among CBE members, I propose here a set of courses on topics that I believe form the core of the profession of medical writing and editing. Before presenting my curriculum, however, I discuss its purpose, the preferred educational preparation for it, and why it focuses on documents reporting biomedical research.

The Purpose of the Curriculum

Susan's curriculum appears to provide a liberal arts education with a focus on biomedical writing, and I have no qualms about such an approach. I simply need to state here that my approach has been to identify the topics that form the core of the profession, as well as those needed to allow students to qualify for the most common employment positions in the profession.

The curriculum is also based on the premise that biomedical writing is now a specialty with its own knowledge base and skill set. This premise is important because it forms the basis of a professional identity. For example, I know several physicians who believe that they write so well that their manuscripts do not require much editing. Yet these same physicians do not hesitate to use medical illustrators—they know that they do not have the skills of an illustrator. Neither do they hesitate to use biostatisticians—they know that they do not have the knowledge of a statistician. They are willing to claim proficiency in writing only because they do not recognize biomedical writing as a specialty, a specialty in which formal, prolonged study of a distinct body of knowledge and a specific skill set is now possible and desirable.

The most desirable educational preparation for biomedical writers and editors is communication.

Educational Preparation

I do not believe that English, by itself, is particularly good preparation for biomedical writing and editing. A degree in English is almost always a degree in literature; that is, a degree in how to read, not how to write. True, some English majors focus on composition, but this focus is dominated by the writing of essays, short stories, reports, and forms of personal expression and is usually applied in the teaching of freshman composition courses. That is to say, I suggest that there are important differences between "knowing how to write" and knowing how to communicate technical information in writing. (For more discussion of this topic, see "The Problem with Technical Writing Is Freshman English", by Britton [2], and "Technical Writing Is Not One of the Humanities", by Lang [3].)

Neither do I believe that science, by itself, is particularly good preparation for biomedical writing, although in my opinion it is better than English. The study of science involves reading the literature of science, which exposes students to the nature and forms of scientific discourse and hence to many aspects of biomedical writing. However, as mentioned above, I believe that skill in the profession must be acquired intentionally, not incidentally, as is the case with many scientists-turned-writers. Thus, I suggest that the desirable educational preparation for biomedical writers is neither that of a scientist who writes nor an English major interested in science, but rather someone who is fascinated by, and schooled in, the relationships among reader, writer, message, and social context. That is, the most desirable educational preparation for biomedical writers and editors is communication.

Communication is a social science. Its study involves learning and applying the scientific method as well as the techniques and strategies by which "one mind influences another". It focuses specifically on the processes of communication, whereas English courses can fixate on the preparation of the written message. I am not arguing that English courses have no place in biomedical writing, only that the preferred intellectual orientation to biomedical writing is not "writing" per se but "written communication".

Reporting Biomedical Research

In my opinion, the fundamental purpose of biomedical writing is to communicate biomedical science and, in particular, to communicate it through the scientific literature, especially the scientific article and related regulatory documents. I do not mean to exclude other areas of the profession, such as public relations, marketing, patient education, and physician education. However, I suggest that these areas of the profession draw their information directly or indirectly from the scientific literature. Thus, an understanding of how this literature is structured seems to me to be essential to the profession.

Central to an understanding of the scientific literature is my construct that docu-

ments reporting biomedical research have 4 dimensions of quality:

- the biology (the importance of the research question)
- the science (the adequacy of research design, data collection, and analysis)
- the documentation (the adherence to reporting requirements—such as the Uniform Requirements (4), CONSORT guidelines (5), and Food and Drug Administration regulations—that specify what information must be included in the manuscript so that the research can be adequately evaluated)
- the presentation (the accuracy, clarity, and economy of the text and visuals)

My experience has been that many biomedical writers and editors focus primarily, if not exclusively, on the presentation dimension. I firmly believe, however, that we must become experts in the documentation dimension as well if we are to increase our value-added to employers and to change the widespread notion that all we do is copyediting. My proposed curriculum, then, stresses the knowledge and skills needed to document and to present biomedical research.

The Curriculum

The 7 courses listed in the table represent what I believe to be the core of biomedical writing and editing in the 1990s. The elective courses allow further breadth and specialization. Each course was designed to qualify for 3 units of college credit on the 10-week quarter system; about 3 hours is to be spent on each of the 8 topics listed for each course. Thus, 2 additional 3-hour blocks of time are available in each course for exams, guest lecturers, special events, and so on. This format could thus provide 24 credits, or enough for a certificate or a minor in biomedical writing and editing. By requiring some introductory science courses, an internship, and more than one elective, the program could easily qualify as an academic major for a bachelor's degree.

A Final Thought

Colleges and universities will begin programs in biomedical writing when they believe that their graduates will find employment in the field and that existing programs are not meeting the demands of the field. Thus, an important step in the professionalization of biomedical writing is to educate administrators of academic institutions about the field and about what curriculum is required for graduates to enter the field.

From my perspective, it is critical that we differentiate the knowledge and skills required for biomedical writing from those currently required in English literature and composition programs. When technical writing took off as a profession in the 1970s, stimulated by the introduction of personal computers, many English departments tried to convert some of their faculty into technical-writing instructors to recapture enrollments that waned after the boom of the 1960s and 1970s. These "retreads" (their term, not mine) were not oversuccessful, for the simple reason that they had no training or experience in technical writing. Today, however, there are doctoral programs in technical communication with curricula peculiar to the needs of technical writers.

Thus, the task I see for CBE is twofold: To educate university administrators about the nature of, demand for, and requirements of biomedical writing; and to support academic institutions with trained and experienced instructors who know what the job entails.

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References

1. Eastwood S. Growing a biomedical manuscript editor. CBE Views 1998;21(2):51-2.
2. Britton WE. The trouble with technical writing is freshman English. J Tech Writing Comm 1974;4(2):127-31.
3. Lang T. Technical writing is not one of the humanities. AMWA J 1987;2(5):3-8.
4. International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. N Engl J Med 1997;336:309-15.
5. Begg C, Cho M, Eastwood S, Horton R, Moher D, Olkin I, Pitkin R, Rennie D, Schulz KF, Simel D and others. Improving the quality of reporting of randomized controlled trials: the CONSORT statement. JAMA 1996;276:637-9.

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