From the U. S. Naval Ordnance Test Station . . .

Training In Written Communication

One Hour of Report Writing Training for the Scientist and Engineer Saves Four Hours of Editing and Publishing

A. EDWARD TYLER

The United States Naval Ordnance Test Station is a Navy Research and Development Laboratory in the middle of the Mojave desert. It has spawned a wide variety of weapons from the Mighty-Mouse rocket of the Korean war to the Sidewinder air-to-air missile of the Cold War and the submarine-launched POLARIS. This technical organization of approximately 6,000 people, with sea and island test sites in addition to its land-locked facilities at Pasadena and China Lake, California, depends heavily on a variety of training activities to up-grade its personnel, strengthen morale, and maintain a high level of performance as a research and development establishment.

Because rapid technological advances depend so much on effective interchange of technical information between the various elements of the scientific community, one of the most interesting training programs is devoted to the improvement of the writing skills of its scientists and engineers.

In pursuit of this objective, several courses are offered simultaneously at the Pasadena and China Lake facilities. Some for credit, by extension from the University of California at Los Angeles and the University of Southern California; others "merely" to get the job done.

The problems to be met and the difficulties encountered are the usual ones

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wherever men seek to communicate through the medium of language:

1. Poor organization of material
2. Cloudy thinking resulting in muddled grammar
3. Inadequate transitions, confusing changes in point of view, etc.
4. Wordiness and obfuscation
5. Incomplete reporting

The basic approach of all courses, is that of a report-writing workshop: Courses are operated more or less continuously; supervisors are asked to recommend students (there is always a waiting list) who actually have a report in preparation, so that the time spent in training the student to write will result in his completion of a specific report-writing work assignment. In addition this approach gives a degree of realism to the training program which cannot be attained in any other way. The report-writing courses are taught by personnel of the Station's Technical Publishing Division whose major responsibility is the editing and publishing of all Station technical information.

Studies conducted by the Technical Publishing Division reveal that for every hour a scientist or engineer spends in training for report-writing four hours are saved in the subsequent editing and publishing of his material. This is in addition to the fact that the training time, as conducted on the work-shop plan, results in the completion of a report required by the student's work assignment (and usually in less time than it would take him to muddle through it on his own).

First-Line Supervisors

So useful has this approach proved to be that training in written communication has been extended to groups on the Station other than the scientists and engineers of the technical staff. One notable example of this type of training is a periodic course for first-line supervisors in the Station's supporting groups, such as test-range maintenance personnel and those responsible for the maintenance and operation of the city of 12,000 persons which is part of the Station's China Lake facility.

To keep the ratio of supporting-to-technical personnel as low as possible, it is essential that the supporting groups operate with as great efficiency as the technical staff.

Conclusions drawn from observation of group dynamics indicate that the first-line supervisor functions in an organization in much the same way that a myoneureplate, connecting the brain to the human muscle, functions in the human body. It is at this point that concepts become reality, the thought and plan are translated into action. Because of the critical nature of this linkage in the organizational communication system, it was believed that individuals in this category should be given first attention in improving communication skills.

Every communication situation comprises, at least, a transceiver, a medium, and a second transceiver. In this simple model, the first-line supervisor is the first transceiver, the medium (considered in the training course) is written communication in the form of memos and reports, while the second transceiver is alternately the group supervised and the supervision of the first-line supervisor. This communication situation is a two-way channel.

It was felt that instruction of the group supervised should be mainly in the mechanics of the job assignment, rather than in communicating about it—this left the first-line supervisor with the main communication responsibility for his group. It was up to him to so transmit instructions that they could be understood clearly and unmistakably (the latter, particularly, in view of some of the hazardous activities involved). His instructions to the group should be so prepared and incorporate such work programming that the work assignment can be accomplished in the most efficient manner.

Again, the method of training is to use work-day situations and materials in the classroom. Official reporting forms were used—again on a workshop basis—on which to make reports required by the student's current work assignments. Similarly, the first-line supervisor's skill in transmitting adequate instructions to his crew was improved by the preparation of appropriate memos, specifications, work assignments, etc., in the classroom. These working papers were then taken out and actually used on the job, with subsequent class review of inadequacies and strong points as revealed by their use in the actual job situation.

While this kind of training activity is not subject to the same type of evaluation that showed a four-hour return for one-hour investment on the report writing training, it is perhaps indicative of an overall improvement in the effectiveness of the supporting groups that the technical-to-supporting personnel ratio has shown a steady improvement over the years.

Effective Terminology

An interesting sidelight on one of the work-shop report writing courses (originated by Malcolm Palmetier, now with Rand Corporation) is the lengths to which the instructor goes in accepting his responsibility for couching his communication in terminolgy with which the students feel comfortable. This course, taught primarily to engineers, was couched in engineering terms of balance, support, stress, equilibrium, etc., rather than in the jargon of the conventional grammarian. Audio-visual techniques were used to demonstrate proper sentence structure and organization of material in terms of these same engineering concepts. The syllabus for this course, appearing first below, indicates the nature of this technique. The second syllabus below is that for the more formal course given for credit in conjunction with the Extension Division, University of California at Los Angeles.

With the continuing advance of our technology, the function of man is going to become less and less that of a work horse and more and more that of a communicator. Even drudgery of the "mental" type—and much clerical work—is being taken over by computers and program controllers of one type or another. This, in fact, is perhaps the genius of our civilization which, if anything can, will enable us to keep ahead of and outperform our inimical competitors in the world struggle of ideologies.

If, then, communication is going to be the chief function of man in American society, anything we can do to improve our skills and techniques in this field is worthy of attention.

SYLLABUS: NOTS TECHNICAL REPORT WRITING WORKSHOP

One 4-hour Session Per Week
(5th and 6th weeks: two sessions)

I. STRUCTURE AND FORMAT

STRUCTURE (1st week)

Opening statement on purpose and procedure. Distribution of syllabus, NOTS *Handbook for Authors,* and Nelson, *Writing the Technical Report.* Fundamental structure: preliminary material, body of the report, supplementary material.

Assignment: NOTS *Handbook for Authors,* pp. 5-15; Nelson, Chapters 2, 5, 13; acquaintance with NOTS *Handbook for Authors,* pp. 19-47.

STRUCTURE, Cont'd. (2nd week)

Discussion, in light of Nelson, of components of body of the report: introduction, body proper, terminal section. Nelson's theory on structure, pp. 27-38. Discussion of suggested report outlines, NOTS *Handbook for Authors,* pp. 8-11. Sample of student's writing. Writing period on individual reports.

Assignment: Individual report outlines; Nelson, Chapters 8, 9, 10.

STRUCTURE, Cont'd. (3rd week)

Nelson's theory on the paragraph as evidence of design. Methods of transition. Orders of headings. Discussion and submission of individual report outlines. Writing period.

Assignment: None.

STATION PUBLICATION (4th week)

Scope of publication program at the U. S. Naval Ordnance Test Station. Technical Publishing Division flow chart. The editor's function. Sketch of photo-offset method of printing. Distribution of *Smart's Handbook.* Writing period.

Assignment: Smart's Handbook, pp. 128-31, 142-53; Nelson, pp. 322-31.

II. THE WRITING PHASE

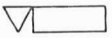
COORDINATION AND SUBORDINATION (5th week - 1st session)

Analogy of specimen incased in clear lucite to explain relationship of subject matter to language of report. Necessary qualities of clarity and freedom from distortion; corresponding dangers of diverting undue attention to medium (obtrusive language, or introducing distortion (ambiguity). Language of report: economical, unambiguous, impersonal.

Main ideas in main clauses. Control of subordinate elements symbolized:

Independent clause		(stable)
Dependent clause		(unstable)
Phrases, particles, etc.		(unstable)

Kinds of sentences symbolized:

Simple		"The rocket struck the ground."
Compound		"The rocket struck the ground, but the troops had taken cover."
Complex		"Just as we looked up, the rocket struck the ground."
Compound-complex		"The rocket struck the ground just as we looked up, but the troops had taken cover."

Subordinate elements fused into sentence, symbolized:

	"When the contractor will deliver the parts is another question."
	"He understands what he has to do."

Discussion of *Smart's Handbook,* pp. 142-53. Class exercises. Writing period.

Assignment: Smart's Handbook, pp. 182-6; Nelson, pp. 322-31.

PARALLELISM (5th week, 2nd session)

Parallel ideas in parallel grammatical form. Use in series, in comparisons, with correlatives. Discussion of *Smart's Handbook,* pp. 182-6. Class exercises. Writing period.

Assignment: Smart's Handbook, pp. 291ff.

PUNCTUATION AND DICTION (6th week, 1st session)

One of several mechanical means of indicating structure of sentence. Main functions: (1) to indicate a "stop," or pause, in sentence, and (2) to indicate exclusion from sentence. Hierarchy of stops (sliding scale, increasing strength; interchangeable):

None		"I own a watch but I never carry it."
Comma	,	"I own a watch with a shatterproof lens and all the attachments one reads about, but I never carry it."
Semicolon	;	"I own a watch, a watch chain, and a cigar clipper, the last a gift from my father-in-law; but I never carry them."
Colon	:	"I own a watch, 60 dollars; I own a watch chain, 5 dollars; and I own a cigar clipper, 10 dollars: but I never carry any of them."
Period	.	"I own a watch, 60 dollars; I own a watch chain, 5 dollars; and I own a cigar clipper, 10 dollars. But I daresay I never carry any of them."

Choice of punctuation mark from sliding scale governed by length and complexity of sentence. Hierarchy of excluders (usually found in pairs, setting off nonrestrictive elements):

None		"This report is indeed a help to us."
Commas	, ,	"The semiannual report, which ran to 400 pages, was sent to the Bureau."
Parentheses	( )	"The semiannual report (see Ref. 12) has proved a real success."
Brackets	[ ]	"The semiannual report [presumably semiannual technical progress report] is proving a real success."
Ellipsis points	. . .	"The semiannual report . . . is a real success."

General considerations of diction. Definitions: term, class, differentia. Class exercises. Writing period.

Assignment: NOTS *Handbook for Authors,* Part 4 to Appendix (pp. 91-127).

STATION STANDARDS OF STYLE (6th week, 2nd session)

Discussion of capitals, numerals, compounds, abbreviations. Preferred mathematical notation. Writing period.

Assignment: NOTS *Handbook for Authors,* "Tables," pp. 72-83.

III. GUEST SPEAKERS

TABLES (7th week)

Editorial consultant, Technical Publishing Division, guest speaker. Informal (text) and formal tables. Examples of tables in several stages of preparation for publication. Questions. Writing period.

Assignment: NOTS *Handbook for Authors,* "Illustrations," pp. 60-71.

ART (8th week)

Head, Art Section, guest speaker. Halftone and line art. Available services for display art. Questions. Criticism of students' art. Tour of Photo Lab.

Assignment: NOTS *Handbook for Authors,* "Abstract," pp. 26, 27; Part 3, pp. 85-90. Student submits abstract of his report and either (1) the report itself or (2) a status memorandum.

IV. PREPARATION OF COPY FOR TECHNICAL

ABSTRACT (9th week)

Principles of abstracting. Criticism of student's abstract. Procedure of submitting manuscripts. Collection of reports and status memorandums.

Assignment: NOTS *Handbook for Authors,* pp. 48-59.

BIBLIOGRAPHY (10th week)

Discussion of NOTS *Handbook for Authors* treatment of bibliography. References and footnotes. Criticisms of class effort. Collection of Nelson and *Smart's Handbook.*

SYLLABUS: NOTS TECHNICAL REPORT WRITING, 851ABC

A course offered at China Lake, California

by

TECHNICAL PUBLISHING DIVISION
U. S. NAVAL ORDNANCE TEST STATION, INYOKERN
CHINA LAKE, CALIFORNIA

This is a 3-unit course offered at China Lake by the University Extension, University of California at Los Angeles, with a member of the NOTS Editorial Branch as instructor. Given without charge to NOTS employees, it is based on long-form technical reports, with emphasis on official NOTS reports. A practical approach is followed, and examples are drawn from manuscripts and final copies of actual Station reports. Assignments are adjusted to suit the needs of students preparing reports in their normal work. Planning and writing the report, tabular presentation, illustrations, English, format, and methods of reproduction are covered. Students submit a long-form report as a "term paper."

GENERAL OUTLINE
(By Periods)

1. Introductory lectures
2. The four basic steps in writing a technical report
3. Preliminary study and development of the plan
4. Development of the plan (body of the report)
5. Development of the plan (body of the report)
6. Development of the plan (remaining sections of the report)
7. Study of introductions
8. Special problems in introductions
9. Discussion of student's written introductions
10. Study of paragraph structure
11. Paragraph coherence
12. Sectional headings
13. Terminal sections
14. References and bibliographies
15. The rough draft; and a study of abstracts
16. The short-form report
17. Review of the first 6 weeks of study
18. Examination (Note: Assignments in Nelson end here.)
19. Progress reports (Note: Students begin to write their long-form reports here.)
20. Diction
21. Diction
22. Authors meet the editor
23. The principles of punctuation
24. Use of the comma, semicolon, period, parentheses, brackets
25. Use of the brace, quotation marks, ellipsis, question mark
26. Hyphenation (unit modifiers)
27. Verb forms and dangling modifiers
28. Relative pronouns and agreement in number
29. Restrictive and parenthetical phrases
30. Absolute construction
31. Compound sentences and compound predicates
32. Rhetoric
33. The offset process
34. Trip to the Print Shop
35. The use of photographs in technical reports
36. Drawings
37. Graphs
38. Graphs and charts (Note: Students' reports due.)
39. Table construction
40. Tables
41. Tables
42. Stenographic details
43. Format
44. Review of students' reports
45. Final review of the course

Texts: Nelson, *Writing the Technical Report,* McGraw Hill
NOTS, *Handbook for Authors of Technical Reports,* U.S. Naval Ordnance Test Station