

Professional Writing in Science and Engineering

Dr. Greg Wickliff

Charlotte Research Scholars

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Professional Writing in Science and Engineering

Professional development training to build skills critical to professional success. Topics include:

- responsible conduct of research
- developing a competitive research fellowship application
- preparing an academic resume
- **professional communication**
- preparing for graduate school

Professional Writing – In this Case, Writing in the Professions

- Curriculum vitae
- Abstract
- Research Poster
- **Final Report**

Definitions of Science

Definitions of Engineering?

What is Science? What is Engineering?

Discovery, Invention

Written or Oral Arguments for New Knowledge

Improved Research Methods Accepted by a Community

Applied Science

Elegant Design for Improved Use, Safety, Public Policy

What are some of the Key Questions of Your Discipline That Interest You Most?

Where are these questions addressed?

How Do Professionals in Your Discipline Most Often Represent and Disseminate New Knowledge?

- Research Proposals
- Research Notes
- Conferences and Professional Meetings
- Journal Articles
- Books
- Community Outreach to non-specialists

A Case History
When Science Met Photography
John William Draper

Draper's Research Agenda

Radiation, Organic Chemistry, Inorganic Chemistry, Physics, Physiology

Publications – More than 60 articles & 10 books

A research agenda shaped by his teachers Edward Turner; Robert Hare; J. K. Mitchell

- Imponderables – weightless particles (or waves) – light, heat, electricity
- Components of light – color rays, heat rays, chemical rays
- Photosynthesis and the respiration of plants, as well as human respiration
- Phosphorescence

Major Accomplishments

*Photochemistry, Spectroscopy, Photometry,
Photomicrography, Astronomical photography, and
Photographic Portraiture*

- Pioneering spectrum photography – the ultraviolet and infrared with the Fraunhofer lines; first photographs of the diffraction spectrum in 1843
- Stating the physical “law” that only absorbed rays produce chemical changes, and early experiments with color imaging
- Making the first successful astronomical photograph –
The Moon – March 16, 1840
- Pioneering work in photographic portraiture

Writing and Philosophy

Aristotle & Arguments of Fact and Policy

- Arguments of Fact attempt to answer questions of existence, definition, or quality.
- Arguments of policy often build upon arguments of fact to answer questions of "what should be done?"
- For answers to be believed and acted upon, they must be credible. Credibility is established by many things in your writing: showing your qualifications or expertise; being systematic and thorough in your analysis; presenting information gathered appropriately, and often in a way that your results could be approximated by other researchers

If I asked you, “What is Light”
how would you answer? 

Take three minutes to respond, and
make sure you consider the point
of view of your discipline in your
answer.

Is Light Electricity?



Attempts to Observe the Sun's electrical force with Mercury & Copper – 1837

January 23rd, 1837

“I have remarked how easily an electric excitement is detected by the evolution of light, the merest movement of mercury upon glass is perceptible and upon this plan no doubt the evidence of the presence of electricity the incidence of a sun beam may be discovered.”

Dibner Library MSS

January 24th, 1837

“Let therefore a large conducting surface as a sheet of copper or zinc be insulated and exposed to the (a) sunbeams by hanging out of the window over the sill (b): from any part of it let a wire be soldered to pass into the room and be of sufficient length to be brought by a gum lac handle to touch the conductor of the photoscope which is placed in a dark closet where the observations are to be made.”

Can All Visible Light Darken
Photographic Paper?

Are Light and Heat the same?

Attempts to Record Moonlight – 1837

Feb 17, 1837 [the Moon]

“It is, however, of great importance to know if this light devoid of heat can produce phenomena like the solar light. Can it produce the blackening of chloride of silver ? The calorific rays of the sunbeam are prejudicial . They antagonize those of the other class. Should not then the moonbeam act with greater energy when even diffused day light causes these changes?”

Feb 20, 1837

“The chloride which was exposed to the moonbeam was found Saturday morning not be be blackened.”

Dibner Library MSS

How Should We Test The Nature
of Light? What Methods, Devices
and Arrangements are Best?

What is the Significance of Your Work?

How Will You Convince Others of Its Significance?

Primarily Through Your Writing

Posters

Conference Papers

Journal Articles

Proposals

Reports

Books

SCIENTIFIC/ TECHNICAL DOCUMENTS vs. THE ESSAY

- Students have more experience reading and writing essays than scientific or technical documents.
- At the workplace or in a research environment, however, you will more commonly be asked to read and write formal and informal scientific and technical reports.
- To read and write such reports well, you need to understand the differences in the ways they are structured, as well as the differences in purposes and audiences.

The Essay



The structure of the essay should be familiar to you --
Introduction, Body, Conclusion.

The body is composed of prose paragraphs that build upon information provided in preceding paragraphs. In general, essays are designed to be read from beginning to end in one reading.

Scientific/Technical Reports or Articles

- The structure of many scientific or technical reports is quite different, although these also retain the basic "beginning, middle, and end" framework.

Scientific/Technical Reports or Articles

- Scientific or technical reports begin with an Opening, continue with a multi-level Discussion, and end with some sort of Conclusion. But these reports are not generally read from beginning to end in one reading.
- Instead, different types of readers (specialists and non-specialists) may read with different purposes. They may begin at different points in the document, perhaps even looking through all the illustrations before reading anything else.
- Portions may be read at one time, then other portions read some weeks later. It takes some time to get used to this idea, and to learn how to write a document that continues to make its points effectively without being read in its entirety.

Scientific/Technical Reports or Articles

- Scientific or technical reports make use of specialized or “technical” language or jargon – a type of shorthand or condensed expression used by specialists. To successfully enter the conversation of a community of professionals, you need to understand and use correctly the specialized language.

Scientific/Technical Reports or Articles

RECONSTRUCTING THE EVOLUTION OF THE LOWER PALEOZOIC MARGINS OF NORTHERN LAURENTIA FROM STRATIGRAPHIC AND CONODONT BIOSTRATIGRAPHIC TRANSECTS

Barnes, C.R.

School of Earth & Ocean Sciences, University of Victoria

Laurentia (Ancient North America) rifted out of the supercontinent Rodinia and sedimentary rift sequences and associated volcanics suggest that the margins of Laurentia were formed in the 760-600 Ma interval. In its drift to a low latitude location in the early Paleozoic, conventional wisdom argues for a long interval with passive margin development. Detailed work on the stratigraphy, sedimentology, biostratigraphy, and biofacies suggest a rather more complex pattern of rift/drift/convergent margin evolution for the continent. Lithoprobe transects have been undertaken in both the current Atlantic and Pacific margins and inboard to determine some aspects of the nature of the rifted margins. However, the geophysical data must be constrained with geological data from the outcrop belts to produce a comprehensive framework.

Scientific/Technical Reports or Articles

Editing –

Learn Conventions of places of publication –
collect models of good work

Have your writing edited and edit for others

Correctness counts – errors lower your credibility

Scientific/Technical Reports or Articles

Penrose, Ann M., and Steven B. Katz. 2010. *Writing in the sciences: exploring convections of scientific discourse*. New York: Longman

Mikelonis, Victoria M., Signe T. Nielsen Betsinger, and Constance Kampf. 2004. *Grant seeking in an electronic age*. New York: Pearson/Longman.

Johnson-Sheehan, Richard. 2002. *Writing proposals: a rhetoric for managing change*. New York: Longman.

Alred, Gerald J. 2012. *Handbook of technical writing*. New York: St. Martin's Press.

Mcmillan, Victoria E., and Downs, Douglas. 2011. *Writing Papers in the Biological Sciences 5th Ed + I-cite*. Bedford/St. Martin's Press.