

Writing for Dissertations and Publications in STEM Fields

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Outline

- My Background
- Writing in STEM Disciplines
- Where to Publish: Conference, Journal, Online media
- Questions?

My Background

- B.E., EE, Bangalore University, 1968
 - 5 Years of STEM courses, very little writing!
- Ten years in electronics industry
 - Developed products, very little writing!!
- MSEE, Ph.D. at Texas Tech, 1978-82
 - First exposure to technical writing
 - Ended up writing a lot – Thanks to my advisor

After Graduate School

- Faculty Member
 - Penn State, 1982-2003; USF, 2003-
- Reviewer for conferences, journals
- Editor, IEEE Transactions on PAMI
 - Associate Editor, Editor in Chief
- Vice President, Publications, IEEE CS
 - Responsible for some 23 periodicals
- President, IEEE Computer Society
 - Responsible for \$40M annual budget

Why Should We Write?

Writing in STEM Disciplines

- Focus is on Factual Technical Content
 - Simple prose, short sentences, itemized lists
 - Number equations, avoid unnecessary math
 - Call out figures, tables; include descriptive captions; Cite sources
 - If a theory paper, give proof
 - If an experimental paper, describe in sufficient detail for others to replicate

Dos and Don'ts

- Include what didn't work (unfortunately most papers don't); science would advance much more rapidly if we didn't have to repeat what others already tried and failed.
- Do not cut and paste from others work – Plagiarism is a major problem since it is so easy to do so today. Use quotes when you must do so (do so sparingly)

Organization

- A Good Paper is Organized into **THREE** Parts:
 - Tell the reader what you will tell (Introduction)
 - Tell the reader what you accomplished (Body)
 - Tell the reader what you told (Summary and Conclusions)
- **PLUS** - A catchy caption, a succinct abstract, and a list of critical references

Your Dissertation Should Answer These

- What is the problem you solved?
- Why is this an important problem?
- What have others done about it?
- What did you do (process, equipment, cost, repeatability, performance comparison)?
- Why what you did is better than others?
- What more can be done to make it better?
- Where have you published?

These translate to your chapters:

- **Introduction and Problem Statement**
 - What is the problem you solved?
 - Why is this an important problem?
- **Literature Survey**
 - What have others done about it?
- **Body of Dissertation**
 - What did you do (process, equipment, cost, repeatability, performance comparison)?
 - Why what you did is better than others?
- **Conclusions and Future Work**
 - What more can be done to make it better?
- **References**
- **Publication List (validates that your work is accepted by peers)**
 - Where have you published?

NSF Format for Grant Proposals

- This is also a good format for Thesis/Dissertation Proposals
 - Project Summary (one page description of resulting activity including intellectual merits and the broader impacts)
 - Written at a level appropriate for a person interested in science and technology
 - Project Description (15 pages limit)
 - Clear Statement of Work
 - Objectives, Significance, Relation to longer-term goals and state of knowledge
 - General Plan of Work
 - Design, Experimental methods, Broader impacts, Timeline and Milestones
 - References

Where to Publish: Conference, Journal, Online?

- Conferences: Typically short papers; incremental work; less rigorous review (exceptions are some CSE conferences); quick turn around; opportunity to network with other researchers and share your ideas; proceedings may not be widely distributed
- Journal: Well developed, more complete, longer papers; rigorous peer review with opportunities for rebuttal; traditionally considered as “archival” work; widely disseminated by publishers
- Online (self): Rapid posting; no peer review (except comments); uncertainty about longevity. Another option: Moderated archive such as arXiv.org

Where to Publish: Other factors

- Conference Selectivity, Organizers, Popularity, Location, Publisher, Worldwide Distribution, Cost, Lead time, etc.
- Journal Reputation, Circulation, Submission to Publication Time, Editorial Board, Publisher, Worldwide Distribution, Cost, etc.
 - Impact Factor is an objective measure of quality (roughly speaking it is the ratio of the number of citations to number of articles in a specified time period), from Journal Citation Report (JCR), a product of Thomson Reuters Institute for Scientific Information.

Who Pays for Archival Dissemination

- Reader (Library) Pays (Limits access to subscribers)
 - Publisher distributes peer-reviewed (quality assurance) content and readers/libraries purchase and maintain archives (for ever) – Stacks of bound volumes; traditional model
 - Author is guaranteed publication irrespective of ability to pay
 - Modern variation for digital content – publisher assumes archiving responsibility – libraries/individuals subscribe to access content
- Author/Research Sponsor Pays (Open-Access Model)
 - This is a new trend to increase access to published research content
 - Some US research sponsors (NIH for example) supports this to increase access to results of research sponsored by them
 - But this would make it difficult for researchers with limited resources to publish their findings
- Which one is better? - This is an Ongoing Debate

Outline: What We Covered Today

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Questions?
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Thanks!