

How to Improve Your Technical Writing and Communication Skills

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Key Elements in English

- Listen, speak, read, and write
- However, we shall focus on technical writing (write) and communication skills (paper presentation, i.e., speak)
- Of course, we will have to spend a lot of efforts on reading literatures (read) and under other people's work through their presentations in seminar, conference, and/or courses (listen)
- So, essentially, we need to cover every aspect of listen, speak, read, and write!!!

Key Issues to Become Successful in Graduate School

- The fundamental question is: what is really new here?
- New Ideas (what is really new with your work, paper, dissertation, etc.)
- Work hard to get the job done (I mean work extremely hard, graduate students are supposed to work hard anyway)
- Technical writing skills
- After your paper is getting accepted, you will have to prepare a technical presentation in a conference
- Putting together the final version of your dissertation

New Ideas

- The fundamental question is where to get new ideas:--)
- We will have to read a large number of technical papers (already published in conference or journals or through personal communications)
- We should attend various seminars on a regular basis
- Each time, when we read a paper or attend a presentation, we will have to ask a key question – what is really new!
- We have to fully understand each paper that we ever read (but the problem is that there are so many papers nowadays, which papers we should select to read anyway)
- Definitely talk to your advisor, other professors in your group/center/department, your fellow students/friends/colleagues, etc.
- But, first of all, you need to identify an area of interest (of course, you can change your interests, but I do not think it is acceptable that you change your main interest every 4-6 months!)

You Will Have to Do Something

- Reading papers is okay at the very beginning of your graduate-student career, but that is **NOT ENOUGH**
- The key issue is that you need to identify a place where you can easily plug-in, this is perhaps the most difficult time for everybody, i.e., to identify a “small” thing where you could start to contribute to the research community!
- This is where your advisor should play an extremely important role! After all, you need him/her to give you some ideas anyway:-
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- I am pretty sure that most of us have some good ideas, we will have to start to implement them...
- We need to work hard

Adequate Training

- Select courses that have course projects (not just written exams)
- Even spending time to re-implement existing techniques is useful during your first-year studies
- Write a technical report to practice and improve your writing skills
- Give an oral presentation to practice and improve your communication skills
- Always write down your “new” ideas in your notebook
- Try to complete this comprehensive training process in Year One

Paper Reading

- Fully understand and digest what you have read
- Definitely take notes, write an one-paragraph summary for each paper you read
- Always ask questions about what is really new
- Please do not read too many at the very beginning, I would say one paper per week during the first 2-3 months, 2-3 papers during the next 4-6 weeks, at least 100 papers during Year One

Technical Writing

- Write one sentence to summarize what you have done (Title)
- Write ten sentences to summarize what you have done (Abstract)
- Write one or two pages for an extended abstract
- Top-down approach (the structure of a paper)
- Bottom-up approach (fill in the details)
- Technical papers should NOT look like novels (or dramas)!

Technical Reports and Paper Writing

- Keep practice by writing many technical reports
- Problem statement is a key to start (what specific problems you or the authors are trying to solve), the introduction section should explicitly include your problem statement
- Why these problems are important (motivations)
- After that, you will have to clearly state what is really new (your own contributions)
- What are the details that are supporting your claims/arguments (algorithmic details, flow-charts, procedures, results, performance improvement, statistics, etc.)
- Possible discussions, conclusions, on-going work, future research directions, etc.

How to Improve Technical Writing

- Practice, practice, practice, etc.
- Read good articles and take notes (write down good words, sentences and memorize good structures)
- Have people with better writing skills modify your draft or help in different aspects
- Fully understand and remember why the new version is really good, so the next time you will NOT make the same mistake!
- The leading sentence is a key to connect what you have written and what you are going to write next
- Although technical papers are NOT novels, you should be able to create some stories and make them a little bit “dramatic”

Oral Presentation

- Prepare your ppt file with a lot of figures/charts/examples, after all, we are working in the area of visual computing (computer graphics, visualization, vision, etc.)
- Write down every words you want to say during the talk
- Try to memorize everything (Our graduate students have a good memory!)
- Don't be too nervous!
- There are certain functionalities in the software that support us to give a very good talk
- Look at the audiences, not the large screen
- Again, practice, practice, practice, etc.

Some Good Mechanism

- Weekly seminar to present other people's work
- Seminar to practice your own talk
- Prepare your ppt file carefully, try to rehearse your talk in great details (at least once per semester)
- There are many many international visitors here at SUNYSB (Stony Brook University)
- Try to ask questions after their seminar
- Give demos to visitors
- Make use of every possible opportunity to practice

Final Dissertation

- If you have done everything that I said earlier, you should have at least 3-5 papers during your five-year studies here at Stony Brook University by the end of your fourth year or by the start of your fifth year
- So, your dissertation is already there by collecting all of your published work, right?!

Discussion

- My suggestions: new ideas (1/3) + technical writing skills (1/3) + oral presentation skills (1/3) = Success!
- Questions?

Typical Problems I have Seen

- Our students do NOT read many papers nowadays, in fact, they tend to read very few!!!
- Most of the papers are available online on the web, however, we seem to be quite lazy not to spend time searching relevant literatures
- Each time we read a paper, we only pay attention to the technical contents, and we have to pay attention to its writing style and the technical writing aspect

A Few Quick Ways to Improve

- Keep a small notebook, write down good sentences and words whenever you see them in a paper that you are reading
- Try to memorize them and reuse them whenever you want to start to write your own papers
- Read as many papers as possible (time permitting), and more importantly, pay attention to the paper's writing style in English

A Few Quick Ways to Improve

- We should try to write more
- At the beginning, we can focus on abstract (one or two paragraphs), extended abstract (one or two pages), then we should go longer and longer (first 4-6 pages, then 8-10 pages, and then 12-14 pages)
- We need to combine the top-down approach and bottom-up approach together
- We shall focus on the entire structure of the paper first, give an outline of each of its sections
- Then we can worry about how to fill in the technical details

A Few Quick Ways to Improve

- Writing a paper is equivalent to telling a story, so we will have to know exactly what story to tell, and why this story is interesting
- The key question is how to make this story being told in an interesting and attractive way, think about it how you are going to tell a story?
- Why should people be interested in your story?
- Why am I spending time to try to learn and understand your story (from a reviewer's point of view)

A Few Quick Ways to Improve

- In the current peer review system, each paper shall be reviewed by 2-5 people (experts) first, and these experts will evaluate your paper and decide whether to accept it or reject it
- What important elements are required for you to convince the reviewers?
- From a reviewer's point of view, what exactly am I look for whenever I review a manuscript?

A Few Quick Ways to Improve

- Review processes: novelty, paper organization/presentation, suitability, technical merits, impacts to the field, the reproduction of the experimental results by graduate students, etc.
- In order to improve our technical writing skills, we will have to fully understand the entire pipeline of the current review practice and start to address each element of the review pipeline very carefully

A Few Quick Ways to Improve

- Practice, practice, and practice!!!

A Few Quick Ways to Improve

- **Listen:** try to attend as many seminars as possible where other people are presenting their own work
- **Speak:** present your own seminar as frequently as possible
- **Read:** read as many papers as possible
- **Write:** practice, practice, practice!!!
- **My own experiences:** after writing 10 papers; after writing 30 papers, after writing 50 papers; after writing 100 papers...
- **Now, we have written more than 300 papers!!!**

