Is the Acronym "STEM" Missing a Letter: "C"?

WHY CAN'T U.S. SCIENTISTS AND ENGINEERS COMMUNICATE MORE EFFECTIVELY?

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Thesis: STEM Without Communications is Nearly Useless

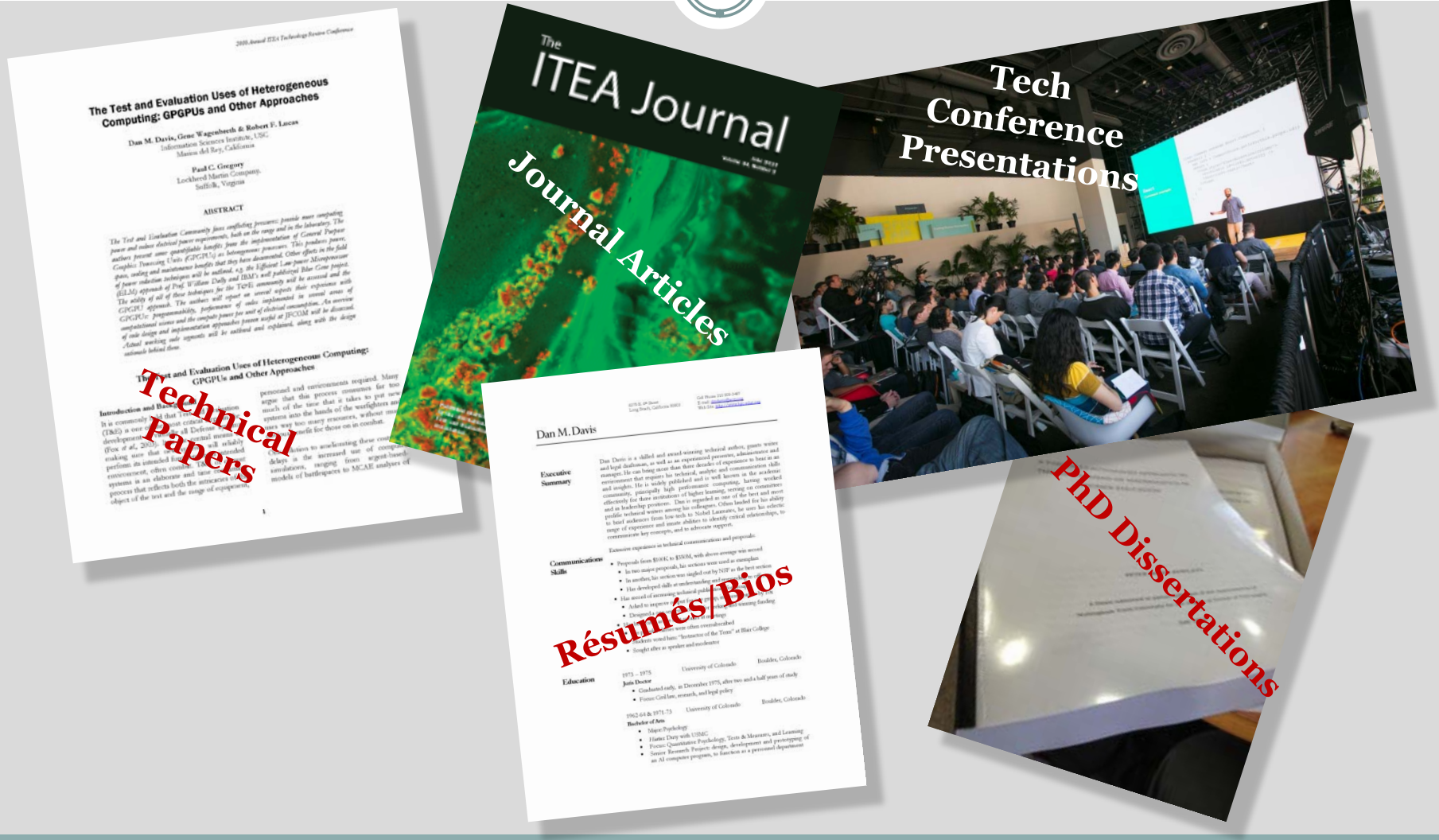
Being capable of and conducting good science is of little consequence unless the technology is transferred for use. Researchers need to effectively communicate their conclusions to others.

The best way to accomplish this is by the use of forceful, accurate and cogent language, written and oral.

Three Major Points

- Technical people spend as much time communicating as doing hard science
- Successful scientists and engineers are good at communicating
- TODAY is the time to start improving your communications skills and learning to avoid career-killing traps

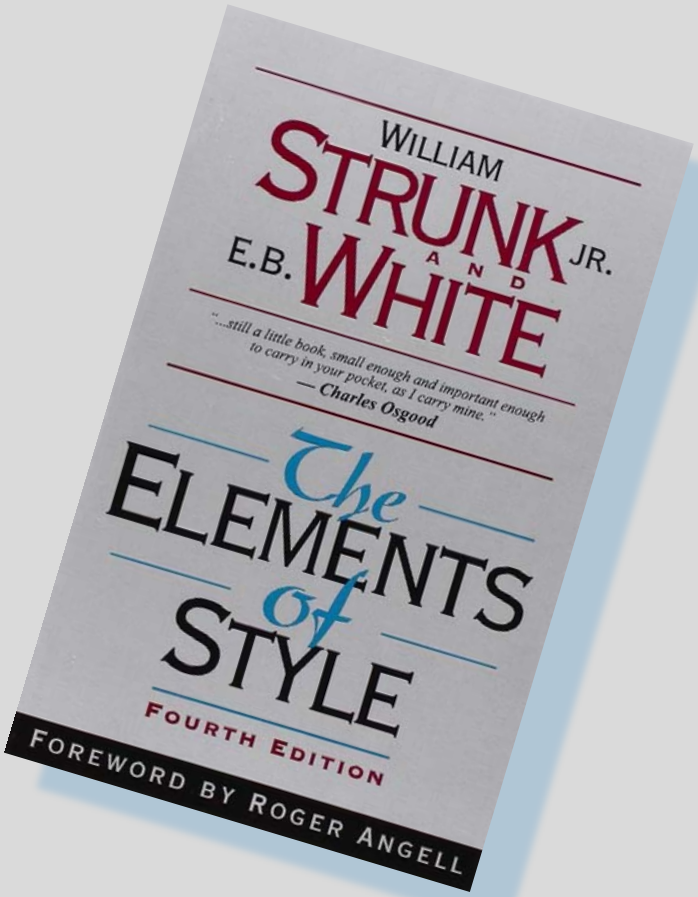
Technical Communication Media



If I Wanted to Write Prose Rather than C++, I Would have opted to be an English Major!!

- It may be natural to eschew the study of English when you are absorbed in the intricacies of calculus
- Many engineers and scientists have made that error
- Employers are burdened by this failure to master language skills
- Society suffers when their investment in education goes for naught due of communication failures
- Former students personally suffer from this loss
  - Example: Skipping English courses at Stanford regretted
  - “Publish or Perish” is not an empty phrase

K & R vs. Strunk & White

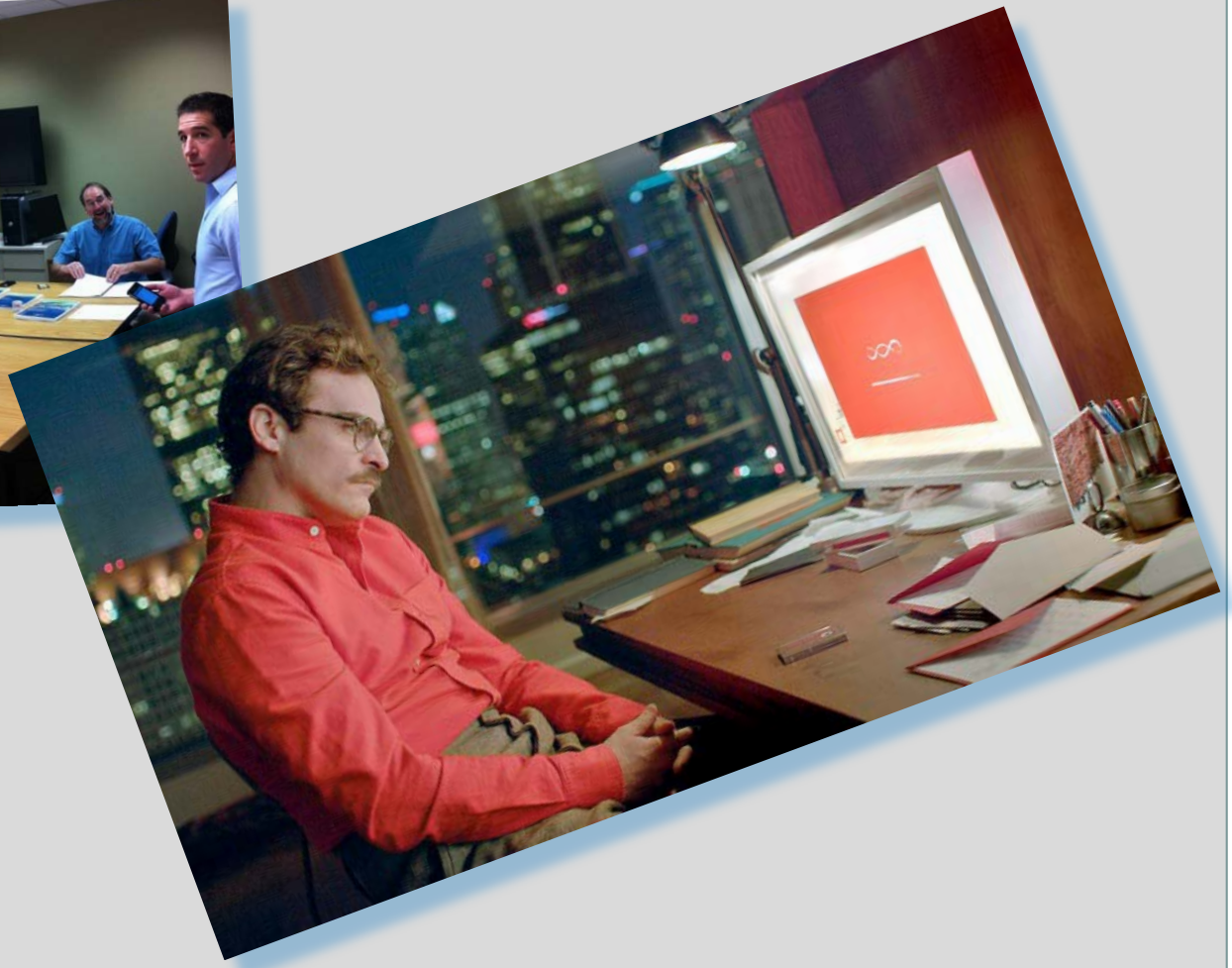


IBM used to give out free copies of K&R, but a major game company now has to give out Strunk & White because their programmers can't write well

Writing Tasks STEM Personnel Face

- Applications, résumés, proposals, technical reports, personnel evaluations, patents, final reports, conference papers, and journal papers
- These tasks often comprise the MAJORITY of the time expended, especially later in the careers
- STEM personnel do not have to be Shakespeare, Conrad, or Hemingway
- They do have to have a command of the language and an organized and committed process for expressing what their audience needs to hear

Proposal Teams and Sole Efforts



Oral Tasks STEM Personnel Face

- Class presentations, quals exams, defense of theses, job interviews, hiring talks, new research briefs, proposal presentations, class lectures, and conference paper talks.
- While the actual time “in the spotlight” may not be great, the time of preparation can be substantial, approaching 25% of work time, depending on duties.
- Oratorical brilliance is not required
- An easy manner, an engaging delivery and an organized presentation are necessary

At the Podium

Career Stiflers or Promotion Killers

- Use of crude, incorrect, inappropriate English, either spoken or written forms
- Inability to maintain poise and good voice control in tense situations
- Any hint of plagiarism without fully citing
- Consistently overstating one's own case
- Failure to acknowledge another's work
- Evidence of any data manipulations
- Malapropisms or math gaffes

The Modern Scarlet Letters

Loutish **L**anguage

Vacillating **V**oice

Pernicious **P**lagiarism

Exaggerated **E**xploits

Misbegotten **M**ath

Deceptive **D**ata

ddavis' Rules for Good Communications

- Know your audience and communicate to THEM
- Analyze what they want to hear from you
- Establish what you want to convey
- Find the intersection of both
- Organize how to say it best
- Draft early; redraft, redraft, …
- Keep major points to minimum: ≤3
- Break up "dense text" with visual images
- Break up long recitations of data with stories
- Practice oral presentations over and over, ≥ thrice

The Ten "Communicationments"

I. Know your audience

II. What they want to hear

III. What you need to convey

IV. Intersection of both

V. Organize to say it best

VI. Draft early; redraft ...

VII. Major points: ≤3

VIII. Use visualized data

IX. Tell germane stories

X. Practice speeches

How to Implement what you are Learning

- Look for opportunities to write and to speak
- Question each rule and every technique
  - Is this helping get my message across?
  - Is there a better way to say this?
  - Am I speaking to myself or my audience?
- Try your materials out on many others
- Repeat drafting and practice your speeches
- Be attentive to reaction of readers or audiences
- Don’t be driven by others, but be open to their input
- Avoid thinking this is just drill; it is **your** future career

The Academic Goal

Reminders

- You WILL write and speak a lot
- You WILL be successful if you do it well
- You MUST avoid career-killing traps

You **WILL** be Writing Plenty

Percentage of Time Devoted to Writing and Speaking

Preliminary Local Straw Poll - Ranked Low To High

Profession	Degree	Writing	Speaking	Total
Navy Junior Officer (Subs)	BS	15	10	25
Research Group Leader	PhD	15	15	30
Retired	PhD	30	5	35
Industry Programmer	PhD	20	20	40
Coder	MS	35	10	45
Coder	BS	40	10	50
Army Lieutenant - Captain	BS	40	10	50
Recovery Room RN	BSN	35	25	60
Navy Electrician CPO	BA	40	20	60
Industry Manager	PhD	30	40	70
Research Manager	PhD	60	10	70
Navy Cryptologist CDR	BA	50	20	70
Research Project Mgr	JD	60	10	70
Navy Instructor CPO	BA	20	50	70
Coder	AA	60	20	80
College Instructor	PhD	40	40	80
Army Major - Colonel	PhD	60	20	80
Researcher	PhD	70	10	80
Navy Linguist CPO	BA	65	15	80
Tech Instructor	BS	10	75	85
Consultant/Manager	PhD	80	10	90
Means		42	21	63

Questions

What do you want to know that I may be able to tell you?

Will there be a time in the future when you will think: "I wish I had asked him that when I had the chance?"

Feel Free to eMail me about anything: ddavis@acm.org

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The comments and opinions set forth above are Dan Davis's alone. He drafted them without direction from anyone and they do not necessarily reflect the position of the Sato Academy, its staff or the Long Beach Unified School District.