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## Writing in Computer Science Courses: An E-Mail Dialog

*Peter Drexel and Roy Andrews*

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From: Peter Drexel—Computer Science Department: peterd@psc

To: Roy Andrews-College Writing Center: roya@psc

roya@psc wrote:

“How does your department teach your majors to write? (as in, what kinds of writing are being assigned in computer science courses, both in and out of classes, and from which assignments do your majors learn to write about your discipline?)”

Our department uses writing in a number of ways. For example, several classes use a “journal” (better known as a lab notebook) to chronicle laboratory experiences. In the Software Engineering and Operating Systems courses, students create manuals for their software projects. These manuals have different audiences: users and programmers. So, students learn to write from different perspectives. With the advent of the World Wide Web, students use multi-media to express themselves. In the Computer Architecture class, students write summaries of technical articles, with their classmates as the intended readers. Lastly, students thoroughly investigate research topics using longer papers: 10 to 12

pages.

— peterd wrote:

“Several classes use a ‘journal’ (better known as a lab notebook) to chronicle laboratory experiences.”

—What kind of experience is being chronicled in the lab notebooks?

Students chronicle the experience of wiring digital circuits or connecting up a network of computers. They describe, as in a journal or diary, what they did, what happened, and how they felt about it. In the more formal and scientific summary section, they follow a standard format when describing what was done and the results.

—What are the benefits of these lab notebooks?

The intended benefits include thinking verbally, learning how to communicate (i.e. write) in a technical environment and learning from a continuing experience.

—peterd wrote:

“In the Software Engineering and Operating Systems courses, students create manuals for their software projects. These manuals have different audiences: users and programmers. So, students learn to write from different perspectives.”

-How are the audiences for user manuals and programmer —manuals different?

Users are most often “normal people.” Programmers are not. :) Oh really? The students’ projects are usually intended to be used by a non-technical audience. Think about something like a word processor or video game. The creators are probably technical

types with an understanding of the desired result. The users focus on the use of the entity the programmers created. They usually don't care how the entity works, as long as it works well.

—How must the writing for each of these audiences differ?

Users need carefully crafted documents that explain how to use a complex system. i.e. Start from here. If you want to do this then click on this icon. If this doesn't happen, then do that. A good index is critical. I think that the key for this kind of writing is to start simple then slowly build the user's confidence. A temptation, on the part of many programmers, is to jump into the elegant technical details. The resulting User's Guide then reads like a dictionary or encyclopedia. This kind of user document is most often confusing and not very useful. Technical writers have to put themselves in the moccasins of the novice users. This kind of documentation is not easy to write. However, the result is often easy to use and may even be "friendly" or fun for the user. An example of this is the \_\_\_\_\_ *for Dummies* books. I don't care for the title but the result is definitely non-threatening and useful,

Technical Reference manuals should explain the software engineering rationale used in the creation of the system. So, technical types need carefully crafted documents that explain how the system was designed. Technical Reference manuals are often used to enhance or repair an existing system. Imagine fixing a modern automobile without some sort of technical reference manual!

-In your opinion, which of these audiences is most difficult to —write for, and why?

I bet the audiences are equally difficult to write for. Putting on the shoes of a novice is not easy for many technical people. They are often so immersed in the technical details, they find it difficult

to back up and look at their “baby” from the outside in. Moreover, for a similar reason (the technical details again), it’s difficult to retrace one’s steps and create the overview and logical flow that is necessary to figure out why the entity works the way it does. See, for example, the *Connections* series of TV shows.

-peterd wrote:

“With the advent of the World Wide Web, students have used multi-media to express themselves.”

—Could you describe a few examples of this kind of expression —and explain why it makes sense to accept this as “writing”?

Students can and do create web-based documents that contain not only text but images, animation, video and sound. These documents can be interactive. Would a prose writer consider this to be writing? Probably not. However, maybe in a modern context the answer may be yes. Isn’t writing the creation of communication: a new way of “seeing” something? Web-based materials certainly are that. Take, for example, an interactive, web-based textbook. Not only can students read about the topic, they can interact with it: try experiments, perhaps look at the subject from more than one point of view.

Peg Eaton used to have her Software Engineering students and maybe the Systems Analysis and Design folks put their stuff on the web. Students would create documentation for various parts of the programs or projects. Then, students would share this with each other by means of web pages. Certainly the potential for distribution of their work is much greater on the web than on paper. Moreover, by using the web, these folks can collaborate in forming their communication. (Like what we are doing right now.)

-peterd wrote:

“In the Computer Architecture class, students write summaries of technical articles, with their classmates as the intended readers.”

—Where do these articles come from? How long are they? How complex or difficult are they for the students to grasp? And —what is an example of what one might be about?

The articles are from technical or scientific journals. These journals are the standard or authoritative literature in our field. Bill Taffe wants his students to do several summaries. If they do three summaries, two of them would come from articles found in conference proceedings or in journals that have titles like “IEEE Transactions of Parallel and Distributed Systems.” The third one can come from the popular literature. *Byte* magazine is an example of such a publication.

The articles range in length from two to ten pages.

Journal articles are usually very dense or compact. As a result, they are often difficult for the students to read. Students attempt to “study” or “learn” the articles. In other words, they use the reading skills they have acquired during their past three years of college. Often, that doesn’t fit well with the articles they’re trying to summarize. Texts are written to explain concepts. Articles are written to succinctly summarize months of work. If you’re not the author, or one of her colleagues, you’re not likely to completely comprehend what she was writing about. (After 25 years in this field, I still find this hard to accept. I guess I’m too much of a teacher!)

-How long are the summaries they write?

One to two pages. The following is from Bill’s web page about the article summaries (<http://oz.plymouth.edu/~wjt/Architecture/>)

writing.html#summaries):

A summary report is a short paper, one to two typed pages, which gives the essence of a larger, more substantial article on a particular topic. It conveys the most important points and conclusions omitting details and examples. A well-written summary is concise, but not merely an outline or a sterile, overly terse, point-by-point recapitulation of the original paper. Use your own words and basic technical language, but omit needless jargon and specialized acronyms. Be faithful to the original author. Convey his views and perspectives. A summary is not a platform for your views or for explaining what you know about a topic.

- Do classmates read the summaries and respond to them to give the student writer an indication of how much of the summary a classmate could comprehend?

Peer review is done on an informal basis. Students may help each other by reading the papers and making comments.

- What is most challenging for the students writing these summaries?

Shifting gears from the explanatory text material to the succinct nature of the journal articles is one of the challenges. A second one is: “What do I leave in and what do I throw out?” Students are supposed to assume that they are writing for people like themselves. So, without completely understanding the article they’re summarizing, they tend to put in too much or not enough. Hitting the key concepts isn’t always easy.

What do they have to learn to write a good one?

They have to learn how to communicate to “themselves.” They

need to learn how to look at themselves from the outside in. They are used to being the audience rather than the performer or presenter. I guess they have to learn how to teach a bit. They need to figure out what someone like them probably knows and what they probably don't know. This is certainly a valuable experience. From 20+ years doing electrical engineering in industry, I know that knowing how to get information across to colleagues is a critical skill. (Many of my colleagues did not have this skill. We nerds were not supposed to know how to communicate! :)

- peterd wrote:

“Lastly, students thoroughly investigate research topics using longer papers: 10 to 12 pages.”

- What kind of research topics? What are some examples?

This comes from an assignment I used to give my Telecommunications (CS416) students. These people came from a rather diverse background. I had majors in Computer Information Systems and Applied Computer Science. I also had students who were obtaining a minor in CIS. Their topics and papers could be on anything that was interesting to them while being sufficiently technical in nature. So, this was a way of getting them to personalize the course experience. Topics? Students wrote about things like cellular telephones, “The Ethics of the Internet, Global Positioning System (GPS)” and so on. I had them do class presentations for extra credit.

- Was there an expected or required form for these papers? Were they modeled on a kind of paper or article in the CS field?

The form I expected was: Introduction, Body, Summary and References. This form is quite similar to that used in articles the students might find in journals like *Communications of the ACM*,

*IEEE Spectrum and IEEE Computer.*

- Who was the audience for these papers?

I told the students to assume that they were writing for people like themselves. I told them to assume that their reader had taken the Telecom course. That way, the reader would be familiar with some or most of the technical jargon. However, that didn't mean they could fling jargon about willy nilly. I stressed the explanation of all jargon. Because acronyms are context dependent, the students need to explain the terms they're using.

- Thank you, Peter, for answering all my questions! I hope you  
- enjoyed answering. What will you do now with this writing  
- you've created?

When you first proposed the idea of writing a ten-page essay on how the Computer Science Department uses writing, I panicked. Who, me??? (The copy of Edvard Munch's "The Scream," that hangs in the College Writing Center, accurately portrays my reaction. ;-) However, and to my complete surprise, this painless exchange of ideas was a marvelous experience! Let's do it again some time. As a matter of fact, there's this paper I've been meaning to revise. Want to ask a few questions?

Oh yes. What will I do with our "creation?" In addition to submitting it to the *WAC Journal*, I'd like to put it on the web. Does the writing center have a web page? Perhaps we could make all the WAC papers available for others to see and use.

Now, about that other paper...