

Teach Your Children Groff

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*I hear and I forget. I see and I
remember. I do and I understand.*

Confucius has something to tell us about the role of computers in schools, and what American students can learn from them. Although he didn't say so directly, I'm sure he meant, "Let them use troff". Any school that wants to teach an understanding of computer technology would do well to *require* the use of GNU groff to prepare all papers and reports.

Why use antiquated 30-year old software when modern graphical tools are so much more intuitive and user-friendly? Because WYSIWYG tools focus attention in the wrong place, and because using them represents a missed opportunity to learn about electronic communication and knowledge representation, to learn logical, algorithmic thinking, and to use the computer to transform information to make it easier to read and understand.

I speak from experience, in a negative sense. Outside of their one Java class, my daughters' whole exposure to computer science amounted to training in Microsoft Word and a few other similar trivial programs. They were shown how to use a computer as electronic construction paper. They were taught, if that's the word, what the computer can do for them, how it could help them prepare their papers, and the fun they could have with graphics programs. Until AP computer science, no one suggested that the computer could *teach* them something, or that it could much more than neatly print their scribbles.

If their experience is representative, American students learn that the computer is a vessel to hold somewhat mysterious, pre-packaged applications that can be useful in the service of some goal. Yet, with the computer as ubiquitous as it is today, isn't it odd, and a shame, that its marvelous ability to teach logical thinking is left entirely dormant?

As anyone who has helped a child prepare that first three-page paper knows, the young

neophyte is far more concerned with appearance than meaning. They have been told what format they must use: 12-point font, double-spaced, with 1-inch margins, and so on. Concern with appearance distracts from the more important—really, the *only* important—part: the writing of the text.

Then there's the word processor itself: they're expected (and were shown how) to use Microsoft Word. Word is a versatile application, no doubt, but simple it is not. If you haven't seen a child of 10 or 12 struggling with it for the first time at 10 o'clock in the evening the night before the paper is due, you've been spared one of modern parenthood's painful experiences.

This is not how we want our children to experience computers. This is not what we want them to learn.

It was not always this way. Only a generation ago none of us prepared our papers on a computer. We wrote outlines, used index cards, made a rough draft, and only then (and normally not before high school) did we type the final draft. The most complicated technological challenge was setting the tab stops.

I wouldn't return to those days and I wouldn't force my children to use such primitive tools when they have other much more convenient ones readily at hand. But there was an advantage we should preserve: because the tools were simple, the emphasis was where it should be: on the *writing*.

As a parent concerned with learning and learning to write, and eager to demonstrate that the computer could *relieve* burdens rather than impose them, I showed both my daughters in turn how to use LaTeX.¹

We downloaded the software, and they marked up their text in a simple text editor. We talked a bit about typography and how the eye scans text.

¹I chose LaTeX rather than troff at the time because it's what I knew. In my estimation, LaTeX is more complex than troff, and has a greater content-appearance separation. Both these properties suggest troff is better suited to student-size documents.

They learned why we call capital letters "upper case". I explained that the computer was much better suited to formatting documents than they are, that that is why computers have replaced human beings as typesetters.

Each child took to it quite willingly, accepted quite easily (after a demonstration) that the appearance of the text in the text editor would be magically transformed into beautifully typeset text. Defeat was snatched from the jaws of victory, however, the following day, when the teacher complained that the LaTeX output didn't conform to her formatting requirements. Some teachers were flexible, but others weren't, and both daughters also felt peer pressure to make their documents look like their friends'. Under these pressures, they both reverted to a word processor. Sigh.

Later on, in high school, both girls prepared graphs for their science assignments. Here the document-preparation problem was answered differently. The same schools that taught Microsoft Word for papers did not teach Excel to prepare charts. Not that I would recommend they do; Excel, like Word, would be a sledgehammer deployed as a flyswatter. But at least drawing a chart from a data series is a good use of the computer, a demonstration of its ability to visualize data. Alas, the solution for science was simplicity itself: graph paper and colored pencils.

Other problems cropped up too. Collaboration was hindered by the expectation that everyone uses and can use Word. Everyone involved got an object lesson in converting to "plain text", but it wasn't a very positive one.

I wish that kids across the country would not be subjected to so pinched a view of what the computer can do for them. I wish their one organic use of a computer for school—preparing documents—would serve the secondary purpose of teaching logical thinking. I want them to think of the computer not as a bundle of complicated applications, but as a tool they can exploit. I want to open their eyes to what it can really do.

What has groff got to do with that? Would 10 reasons do?

10. Manuscript preparation is truly simple. Any text editor does the job. On Windows, Notepad will do. That focuses the student's attention at the time of writing where it indisputably should be: on the *text*.

9. It is an introduction to programming. A troff document is an input to a program that will "compile" it into a different form. Because the formatting instructions are expressed explicitly, the student sees, in a very simple way, the computer's capacity to transform information for easier comprehension.

8. It teaches that semantic meaning is both separate from and related to appearance. Although troff doesn't enforce this separation in the way that, say, SGML does, troff macros can serve much the same purpose.

7. It serves as a good example of what computers are good at that people aren't: consistency. Once defined at the top of the document, troff will never veer from the established line and page lengths. Anyone who's had to unmangle a formatting problem in a word processor at the eleventh hour will appreciate the value of this particular lesson.

6. If you haven't prepared a simple graph with *grap*, you don't know how easy it can be to convert a table into a line. I would venture that if every science teacher and student knew how to use *grap*, graphs would become an integral part of the curriculum instead of an addendum. Having more students dealing with more data can only be a good thing. Also *eqn*. Really. Wouldn't it be better if physics assignments included graphs *and* the equations they reflect?

5. It removes crutches. I'm not so sure that the embedded spell-checker teaches spelling. I know its suggestions sometimes make for interesting howlers. And I'm absolutely sure we don't want style choices taught by a green squigly line based on a proprietary algorithm.

4. It teaches the value of free software. It shows that the computer is a tool for computing, not merely an empty repository to be filled with purchased applications. *groff* runs on every OS a student is likely to use. *troff documents* are easily exchanged because they are plain text. Students working together don't need to have Windows, or Microsoft Word, much less the same version of Word.

3. It teaches typography and, through that, critical reading. Fonts, kerning, line length, leading, vertical space, etc. are all choices typographers make to influence how the document is viewed. Back when Marshall McLuhan's *The Medium is the Message* was new, we could only imagine how one text might appear if expressed with different typography. *troff* makes it possible

to format one text multiple ways, and to *experience* the result directly, with full knowledge of the manipulation and the manipulator.

2. It gives them a tool they can use for years and years, that will grow with them from three pages to 3000, if it comes to that. As technology changes, undoubtedly the choice of text editor will change, too, but the macros will remain steady friends, and the documents will remain viable long after Word goes the way of Wordstar.

And my number one reason to use troff in school is

1. It teaches that the computer, properly conceived, is slave, not master. It can transform information to more comprehensible form, and there is no reason to answer its demands to look after minutia. The computer can take care of nonessential details like hyphenation and the placement of footnotes, removal of widows and orphans, or formatting bibliographic entries. The author prepares the text; the computer renders the document.

My daughters' time in school spanned the past 25 years, from MS-DOS to the iPad, from 1200 bps Compuserv to broadband Netflix. I watched (and, sometimes, helped) them use their computers, and I saw what and how their schools taught them about them. These were good schools, and the computer literacy of our household is surely above average. But if their experience is at all representative, American high schools do not teach much computer science, and American high school students graduate with only the most superficial understanding of how computers work and what they're capable of.

In choosing troff, we choose something both simpler and more powerful than a word processor, both to the immediate end of preparing a text, and to the larger end of preparing a mind. A student using troff gains an understanding of the capabilities of the computer while developing the logical habit of mind necessary to use it effectively. I cannot think of a better role for the computer to play in education.