

## **What if the Internet ran like the U. S. public education system?**

### *The Willful Suspension of Disbelief*

During my doctoral studies I was introduced to a revolutionary idea known as “formative evaluation.” While it seemed pretty straightforward to me, it seemed like a revelation to some of my cohorts. To them, any kind of evaluation equaled testing which equaled pain and suffering. As I sat there pondering the importance formative evaluation, I realized that the geeks that hacked the original Internet protocols understood it (though they called it by different names such as “error checking”) and as it turns out, without error checking the Internet would be almost completely useless. Realizing that K-Graduate schools in the U.S. seem to be largely without formative evaluation, I began wondering if they are almost completely useless, too.

When watching movies (such as my new favorite – Crouching Tiger, Hidden Dragon) we are frequently called upon to suspend our disbelief to allow the telling of the story. In order to follow the story I am about to tell, you will have to suspend disbelief as well. You will have to believe that the Internet and the U.S. educational system are very much alike; at least, similar enough to be meaningfully compared. Think about it this way: the Internet has been architected as a huge system of omniscient servers and basically information-less clients. In this architecture, servers should provide clients with information and other services that the clients can understand and utilize. Clients don’t talk to each other much, because such peer-to-peer services are just the havens of software and “intellectual property” pirates anyway.

Imagine now that the U.S. educational system had been architected in a similar manner, with omniscient teachers and basically helpless students. In this organization, teachers should provide students with information and services in ways that they can understand and utilize. Students would hardly ever communicate directly with each other about their education, because to do so would be “academic dishonesty.”

So, suspend what you know about reality and let’s pretend for a moment that both the Internet and the U.S. educational system are request-broadcast media (i.e., a client makes a request or a student attends a class, and the server provides information or the teacher provides instruction).

### *No, Virginia*

Back in 1974 Vint Cerf and Bob Kahn published a paper describing the transmission-control protocol, or TCP. Via TCP, information on a server would be broken up into several smaller datagrams and sent to the receiving client as so many packets. TCP’s predecessor, the Network Control Protocol, had assumed that the network was perfectly reliable, which (surprise) it turned out not to be. TCP, on the other hand, is designed with the assumption that the transmission channel is unreliable. That is, TCP is designed to recover when packets get mangled during transit or simply disappear off into the ether (why do you think they call it “Ethernet”?)

How is this wonder of error checking accomplished, you ask? The client sends an acknowledgment to the server after receiving each packet. If the correct acknowledgment is not received, the packet is resent.

Now, this may not seem like brain surgery (and I am certainly glossing), but let's examine the U.S. educational system within this same framework. Via the Spray and Pray Protocol (SaPP) generally used in American classrooms, students enter a room to sit and listen to the teacher ramble on in a range of manners spanning from "tolerable" to "insomnia remedy." (In a recent high-tech development, students can now read these brain dumps written in eye-numbing prose ranging from "utter boredom" to "for the love of Pete please kill me now.") This broadcast of information from teacher to student differs from data transmission over the Internet in one very important way: *there is no error checking.*

### *The Slashdot Effect*

"Wait, wait!" teachers cry. "There is homework; there are tests. We regularly check to see if students are 'getting the message.'" And while students around the world and I cringe under the weight of agreement, I remind you of the final portion of TCP's error checking mechanism: retransmission. Teachers, trainers, and other employers of SaPP certainly check for errors, but do they ever retransmit? When a student fails a test, do they Spray again, hoping to correct the problems in the original, mangled transmission? If a student misses a transmission for whatever reason, do they Spray again?

"Well of course we don't!" teachers cry. "We're too busy working second jobs to buy textbooks for our kids to ever do anything more than once. We've got a curriculum to cover!" This response reminds me of the famed Slashdot Effect (see <http://slashdot.org/>). Slashdot is a news site wildly popular amongst hard-core geeks, and coverage of your website on Slashdot is among the most coveted and feared prizes in Geekdom. The second a story about a website is posted to Slashdot, that site begins to be hammered by literally hundreds of thousands of visitors. Within seconds, would-be site viewers are greeted by an "Error 403: Server Too Busy." It will generally be a day or more before the site is available again.

The content coverage argument seems to be an "Error 403: Teacher Too Busy." Too busy to do what? Too busy to help students learn. If you have ever *really* needed information from a website and been unable to reach it because of broken links or other errors, you know the frustration that many of our students feel regularly. If you believe that students fail because they are too busy watching Beavis and Butthead or South Park to care about their studies, you're wrong. *Really* wrong.

### *The World-Wide Wish*

Let's think for a moment about how useful the Internet would be if it operated like the U.S. school system. Servers would spray packets to anyone who requested them, but would be too busy spraying new packets to retransmit any that had been mangled or lost along the way. Imagine it... viewing the simplest text-only webpage would require conditions just short of full-on planetary alignment. When the World-Wide Web became

the World-Wide Wait, at least the information came if you waited long enough. A step back to the Network Control Protocol, or in other words, back to the assumption of channel reliability, would turn the World-Wide Wait into the World-Wide Wish. Can you imagine enjoying such an Internet, in which the majority of the webpages, e-mail and other information you received was garbled, incomplete, both, or just missing altogether? Can you imagine using it eight hours a day for seventeen or more of the first twenty-two years of your life? And yet, this is exactly how we ask people to spend their treasured youth: as recipients of all the SaPP they can swallow.

“If things are as terrible as you make them sound,” an at this point indignant teacher cries, “then how do students ever manage to learn anything?” They try their very best to get a clear transmission (e.g., obsessively writing down every word the teacher says), and then do their best to infer or otherwise figure out the meanings of ambiguous messages. Perhaps they’ll ask a peer if they got such-and-such a transmission, and if it made any sense to them or not (although too much of this is “cheating”). Perhaps they will resort to genuinely dishonest tactics. Who knows how students manage to do it? I mean, they’re pretty much on their own. During students’ formative K-12 years, their teachers don’t even have office hours for occasional, brief one-on-one visits.

#### *Flame-retardant and the Final Question*

All of this should not be construed as an attack on teachers. I love (most) of the teachers I have had over the years. They were heroes with the hearts of giants, overcoming absolutely impossible odds to help a thick-headed-good-for-nothing like me learn everything from ballet to Japanese. I am not questioning teachers, their ability, or motives (generally speaking). I am questioning the U.S. educational system. And my questions for the system, both K-12 and post-secondary, are these: What is the proper role of formative evaluation in education? How can student-empowering formative evaluation be better integrated into the system?