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# E-Learning

## Is It All It's Hyped Up To Be?

The year is 1981. An undergraduate is thumbing through volume 12 of *Oceanic Abstracts* for 1975 in the quiet of the university library. Only another four years of abstract indexes to go and, by tomorrow, he should have all he needs for his dissertation on storm surges in the North Atlantic. All that remains is to work through the abstracts, decide which papers are worth reading in full, find them somewhere in the library (hopefully), and he will be set up to start writing in the next week or so. It is amazing that such a thing exists—a journal of oceanographic journals—and he wonders how anyone could have managed without such a resource in the past.

The year is 2011. An undergraduate just typed in the key words for her dissertation on storm surges in the North Atlantic on Google Scholar. She is impatient, as the system is a bit slow, and it takes almost a minute before 352 abstracts pop up in front of her. She scans down them and clicks on one. She types in her Athens password and a few seconds later a PDF of the paper is downloaded onto her computer.

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This assignment is going to take hours! It might even mean missing lunch in order to get all she needs to start writing later this afternoon.

Meanwhile, back in 1981, our undergraduate realizes he is late for a lecture and rushes in just as the professor starts. For a few years now, some people have been using overhead projectors, which are great, as they are far clearer than the chalkboards. A couple of professors even use 35-mm slides, which are really clear. The only problem is that the lectures now tend to run quite quickly as the professors have all the information at hand, and it can be hard to keep up—especially if there are complex diagrams to copy down. The better ones do pause and check to see if students are still writing before moving on, and some even provide photocopies of the more complex diagrams. The student will get around to redoing the notes later so that he can read and understand them, and check he hasn't missed anything critical.

In 2011, our undergraduate's iPhone beeps to remind her that she has a lecture to go to and, tempted though she is to download the relevant Microsoft PowerPoint notes and finish her dissertation literature review, she decides it is probably worth going. When she arrives, she picks up the bundle of notes at the front and settles down to 45 minutes

of coastal ecology—all in glorious Technicolor with a few film clips for good measure. She notes a dusty object in the corner with a glass top and an arm with a lens on top—but has no idea what it does. She decides that actually Wikipedia will probably give her most of what she needs for the literature review and settles down to watch a time lapse of seagrass over a seasonal cycle.

Thirty years ago, as an undergraduate, I couldn't even imagine how technology would not only change and enhance the way that undergraduates learn, but also the teaching habits of their professors. From a laptop anywhere in the world, we can download journals, books, data for projects, lecture notes—the list is almost endless. More students are accessing remote learning, that is, sitting for degree courses without having to spend much, if any, of their semester on campus.

I can make the material I teach far more interesting with content from a wide range of Web resources. The core content is my own, but it is easy to download high-quality diagrams and animations to illustrate everything from Atlantic sea surface temperature to whale migrations—with credits to the original source, of course. Type “Atlantic SST” into Google Images and over 450,000 little icons will appear in 0.31 seconds—at least half of which

actually relate to SST in the Atlantic (and one to a rusty Volkswagen?!). I can set up course notes on our online learning environment, and put all of the material delivered in lectures there as well—fantastic! Even midterms can be set as online exercises, and we are beginning to move toward automated marking for some first-year modules.

Students can at last attend lectures and listen to what is being said—having a chance to understand as they learn. They can also spend time focusing on reading the journal articles rather than the days it took me just to track the papers down. The professors can focus on teaching and transferring skills, rather than battling with tons of paper and marking.

When it comes to practical projects, extensive data sets are available—take the amazing PO.DAAC data sets from NASA (<http://poet.jpl.nasa.gov>). I don't need to download images of SST of the North Atlantic from Google—I can create my own original data direct from the Web. A task that, 20 years ago, would have taken a PhD student most of his or her three years can now be done in a few minutes. So, our present-day students must be pushing back the boundaries of science and learning at an amazing rate, and we must have lots of spare time now to explore new areas of science and teach to an even higher standard?

As I read the forty-fifth essay of the day on Atlantic SST, my heart sinks as yet another regurgitation of Wikipedia sits in front of me. The same diagram, the same lack of in-depth discussion, and the same errors. I am as guilty as the next person of using Wikipedia as a first search on a subject new to me, but will at least search out a closer truth of the current thinking from the wealth of

peer-reviewed published material that is at my fingertips. I've even been known to correct really bad Wikipedia drivel. In despair, I then decide to flip through the feedback from my students on the course assessment. One message keeps coming through: "*Your PowerPoint slides don't contain all of the discussion you give in lectures. Not only do I find I have to attend the lectures but I also have to make notes.*" Did I miss the purpose of me giving a lecture? This "complaint" among students is growing and is one of the most common for all of my colleagues, along with "*I sent an email and you took all day to answer it.*" It probably got buried under the other 95 received that day. Our labor-saving technological revolution hasn't saved a single minute of time—it's filled every minute up with far more mind-numbing material instead.

Don't get me wrong—I'm not some Luddite who misses the days lost in the depths of the library. I certainly don't miss the months taken to get data on magnetic tapes, and the weeks taken to process them. But what is clear is that e-learning doesn't always lead to better learning outcomes for the student. It enables more to be achieved but leaves less time for reflection and thought. We become bombarded with information but don't have the time or capacity to process it all in our minds. This matter is ironically made worse by communications technology. I used to delay the in-box of communication by not walking to the mailroom until the afternoon to pick up my six letters, and the landline phone couldn't get me in the library. Now, my email in-box pops up every two minutes with the latest "urgent" missive, followed by text reminders on my mobile phone if I haven't responded

in 30 minutes. At least the mailroom only has two letters for me—both junk mail. We, and our students, are having to multitask more, and good innovative science doesn't always go hand in hand with the pressure of extreme multitasking. A recent study commissioned by UNESCO on effective science communication showed that, while good presenters of science are often multitaskers, the best science innovators are not—some sit on the edge of the autistic spectrum. If one were bold, one might even suggest that far from enabling our best young scientists to develop, e-learning and modern communication might even be hampering some of them.

University teaching should benefit enormously from improved communication and technology, both in and outside of the classroom. But we do have to be aware of the limits. There needs to be a sea change in how some students approach learning in the twenty-first century. They need more than ever to question, to discuss, and to develop the material they receive—whether from the Web or lectures—as has been the foundation of academia throughout time. They need to learn how to cherry-pick, not only the information and data they deal with but also the countless tasks that hit them every day. Teaching staff also need to review how technology and the Web are used. We are in danger of fewer contact hours with students, which a few might see as a benefit, with diminishing skills and knowledge transfer. The time saved by the Web and e-learning should be used to improve the quality, not the quantity, of learning. 📧