Re-inventing the Lecture

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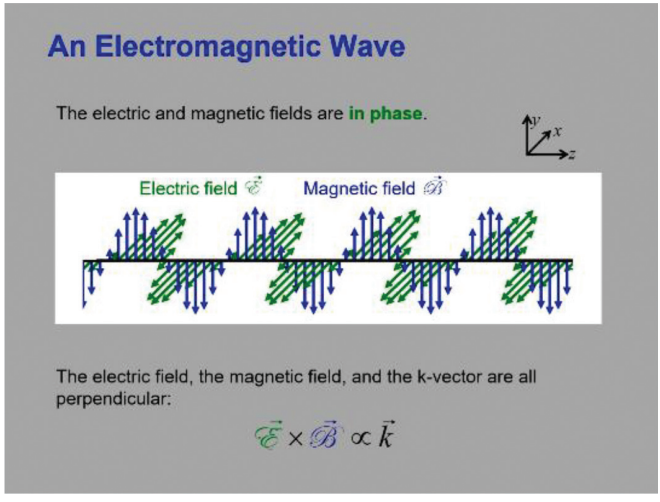
The class lecture hasn't changed in 5000 years, continuing to comprise a pitifully dull talking head mumbling before a bleak blackboard. Having completely sat out the ongoing spectacular technological revolution, the class lecture remains inherently dull and often exacerbated by inadequate teacher knowledge and communication skills. Worse, lecture preparation is time-consuming, and lecture notes are not amenable to being shared. So, as with books before Gutenberg, the task of preparing lectures must currently be performed independently and hence massively redundantly by every teacher in the world. Lectures absorb *tens of billions* of human hours annually.



A snapshot of a slide. In addition to animations, the wave also actually propagates across the page.

So, it's time to re-invent the class lecture. If lectures were actually exciting, students would pay attention, not because they fear a low grade, but because they'd want to. Alas, it's impossible for a talking head to effectively convey this excitement. Teenagers easily remember minute

details of popular movies seen years earlier but often can't recall key ideas from the previous day's math class.

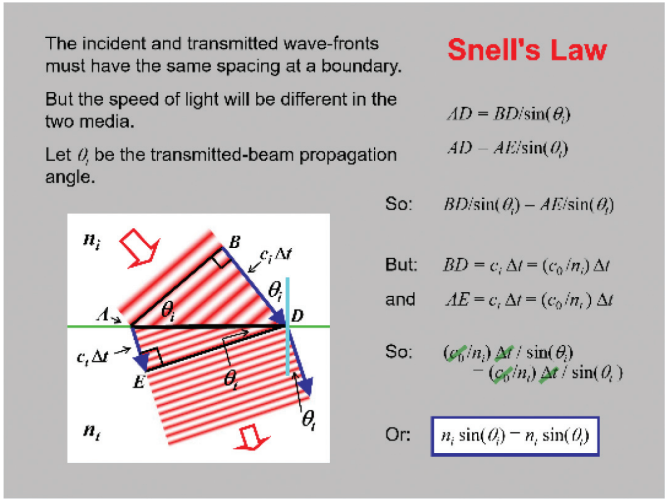
As a result, I've created visually exciting, elegant, high-tech PowerPoint lectures, packed with colorful gifs, animations, images, and diagrams. Then, during the pandemic, I carefully wrote entertaining scripts for, narrated, and meticulously audio-edited them, yielding near-professional videos of entire Modern Physics and Optics courses (see frog.gatech.edu).

While still works in progress (I'm still learning the relevant skills), they're vastly superior to live lectures. As downloadable movies, they can be watched anytime and many times, greatly reducing student anxiety. Also, they can be shared with the world, solving the redundant-effort problem.

These videos also immediately solved one pesky problem: the ubiquitous exponential decay of college class attendance over the semester. In my optics course, because they could do so anytime, nearly all the students reported watching 100% of the lectures. Also, grades were spectacular, mostly A's for the first time in a course of mine.

Now, of course, we can't expect teachers to have all of the skills or time to create such lectures. But we don't need to. We only need *one*. Or, better, one *team* of teachers. Perhaps the Gates or similar foundation would provide grants of,

say, $200,000 per team per course. Creation of, say, 50 high-school and 200 college courses, each at two different levels, would cost $100M, a small fraction of the $2B spent reducing class size in a previous failed attempt to improve student performance.



This derivation involves multiple animations for the text, diagram, and equations.

Implementation of this proposed approach will do for lectures what Gutenberg did for books. Teachers could then spend their newly available time, say, acquiring more knowledge and working with students.

As the entire world acquires Internet access, such lectures could bring quality education to even the poorest schools. Indeed, this effort could inspire other foundations and companies to provide Internet access to the one third of the world that currently lacks it. Finally, in countries hostile to the education of girls, girls could self-educate by privately watching such lectures. PowerPoint can translate narrated lectures into 60 languages.

In conclusion, I believe that this transformation is long overdue and will reap benefits currently unimagined.