

## *Teaching with Technology* *Volume 2: The Stories Continue*

### *Technology, learning, and free will*

**G. Christopher Clark**

I have never been completely satisfied with the term “educational technology.” The phrase implies two things: 1) that technology is doing the work and 2) that it educates, no matter how people use it. That sounds like determinism to me.

Determinism is a philosophical concept which suggests that everything that happens was bound to happen; all events are predestined by earlier events and we have no choice in the matter. Technological determinism, a related theory, says that technology development follows a path that is predictable, beyond cultural influence, and has inherent effects on society. In my world, technological determinism is the belief that a tool inherently has either a positive or negative effect on learning.

Published by the  
***Learning Technology Consortium***

Edited by G. Christopher Clark,  
University of Notre Dame,  
and Sherry A. Clouser,  
University of Georgia

<http://ltcessays.wordpress.com>



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

---

Chris Clark is Assistant Director of the Kaneb Center for Teaching and Learning at the University of Notre Dame. He works in the Learning Technology Lab, helping faculty integrate technology into their courses. He also edits the blog “NspireD2” and teaches “Applied Multimedia Technology”. Clark earned a BA in Spanish from Cornell and an MA in education from the University of Rochester.

It may help to relate these ideas to woodworking. A real carpenter knows a hammer isn't good for everything. She uses it to pound a nail into the garage wall, but not to split a log or fasten one piece of metal to another. A professional chooses the right tool for the job at hand; to a child using a hammer for the first time everything looks like a nail. And when a man like "Tim the Tool Man" has a brand new two-speed pneumatic hammer all bets are off.

The opposite of determinism is free will. It is fundamentally a theological construct, but I'm going to stretch it into my domain. In education, free will means that professors are able to make choices about how they use tools. The ways in which we can use technology are not somehow foreordained and restricted by nature.

*An educator wants classroom technology that is innately engaging, inexpensive, easy to use, infallible, and pedagogically effective.*

Modern human beings live in a complex world, and we are constantly looking for ways to make our lives simpler. We hunt for the Holy Grail of risk-free easy answers: a diet pill with no side effects that makes us lose weight without having to exercise, or an investment that earns 10% annually and comes with a money-back guarantee. An educator wants classroom technology that is innately engaging, inexpensive, easy to use, infallible, and pedagogically effective.

In the process searching for useful technology, a professor will occasionally ask me, "Will this tool help?" At first blush it sounds like they believe the mere introduction of a device or piece of software could automatically improve their teaching. I'm pretty sure that's not what they mean, so my answer is always, "It depends. How are you going to use it?" I believe that free will, as applied to technology, means that educators are free to choose to apply a tool well or use it poorly.



### *You've heard the claims*

Vendors make all kinds of claims about the educational effectiveness of the technology they sell. Without much effort I was able to find the following descriptions on product websites:

- "Improves every aspect of education"
- "Everything you need to achieve long-term success"
- "Teachers worldwide use [our] products to transform teaching and learning"
- "Can be used at all grade levels to build critical thinking and writing skills"
- "Will improve learning and study skills"
- "Makes learning more effective"
- "Recommended by 99% of teachers"

We want the world to be simple, so we want to believe these claims. We would also like to believe those emails about winning the Bolivian lottery.

Some manufacturers insist their statements are based on research. Unfortunately, much of that "research" compares a traditional strategy that does not employ technology with a new strategy that uses a new technology. No effort is made to determine the impact of the strategy alone, and any successes are attributed to the technology. The fact that teachers who use smartboards get good results doesn't necessarily mean the smartboards are responsible. It was most likely coupled with a clever and engaging activity.

Another research concern is that we often measure the impact of a new technology after a brief exposure. This increases the likelihood of a novelty effect, where performance improves initially in response to interest in the new technology itself. We're too impatient to test the device for two semesters and give the novelty a chance to wear off. Instead we take a survey after a three-week trial, while everyone is still excited about the new tool.

After an exhaustive study of media comparisons, Richard Clark determined that the choice of one technology over another did not impact student learning "any more than the truck that delivers our groceries causes changes in our nutrition" (Clark 1983). Robert Kozma challenged Clark's black-and-white assessment of the data: "If we move from 'Do media influence learning?' to 'In what ways can we use the capabilities of media to influence learning for particular students, tasks, and situations?' we will both advance the development of our field and contribute to the improvement of teaching and learning." (Kozma 1984).

*Example 1: PowerPoint*

A growing number of college faculty members believe that PowerPoint is a bad thing. Period. Headlines favored by this anti-PowerPoint bandwagon read “Death by PowerPoint”, “PowerPoint is Evil”, and “PowerPoint is the Enemy.”

“Imagine a widely used and expensive prescription drug that promised to make us beautiful but didn’t. Instead the drug had frequent, serious side effects: It induced stupidity, turned everyone into bores, wasted time, and degraded the quality and credibility of communication. These side effects would rightly lead to a worldwide product recall.” (Tufte 2003)



Shame on the people who believe the preposterous claims of vendors in the first place. PowerPoint is not a drug. You don’t simply swallow it and wait passively for it to work. Users have to make deliberate choices about how it is used. Maybe I should feel sorry for the gullibility of the people Tufte describes; they are probably also wiring scammers thousands of dollars in order to claim an inheritance.

To use an artistic analogy, the painter is more often the problem than the canvas. Lecturers misuse PowerPoint through laziness, lack of imagination, and inertia. Some believe they must keep slides on the screen all the time, as if turning off the projector would somehow break the spell. Students like having class notes appear on the screen, but does it help them learn? Educators like to transform a class outline into visuals, but is that an effective way to present content?

PowerPoint is admittedly easy to use poorly, as are Word and Excel – or chalk on a slate. Sadly, PowerPoint has become the focus of so much criticism

that we hesitate to defend it. Blaming the tool conveniently deflects criticism from those who deserve it, leading the authors of lousy presentations to believe they can’t help it.

*Example 2: Clickers*

While PowerPoint was acquiring a bad name, audience response systems were growing in popularity. These products employ TV-remote-like devices called “clickers” that allow students to wirelessly submit responses to questions, even in a large lecture situation. What could be bad about that? Anything that helps students to participate must be a good thing, right?

Derek Bruff (2009) has written an entire book that details all kinds of ways to use clickers well. Among other potentials, they can provide shy students a way to speak up, get distracted students engaged, and help the professor get a handle on student understanding. The trouble is, the clicker itself doesn’t do these things automatically. The professor has to deliberately craft good questions and determine the best times to ask them.

Some faculty members only use clickers as a tool for taking attendance and administering pop quizzes. This is likely to give the technology a punitive connotation in the student’s mind. Imagine that in one class a student is told that their clicker responses are anonymous and they can respond freely to sensitive questions; in the next class they are signing in and being quizzed. My point here is not that attendance-taking is the “wrong” way to use clickers. Rather, it only scratches the surface of the possibilities suggested in Bruff’s book. In the same way, stopping at bullet points only hints at the potential of PowerPoint.

Consider books as a technology. There are many poorly written books, yet no one talks about “death by books.” After we read a book we are free to conclude that particular book was awful — we don’t feel obligated to criticize books as a medium. In contrast, PowerPoint is approaching the status of laughingstock, while clickers are seen as a panacea.

*The expectation for the wiki pages was that students were to produce high-quality materials from which other undergraduates studying this period could benefit*

### Recommendations

By now, I hope you are getting the message that educational success is more about strategy than technology. So what makes for effective teaching and learning? You probably already know many strategies that work well, but hundreds of books and articles are out there to provide further help. Tom Angelo (1993) offers a “Teacher’s Dozen” of strategies; here are three with potential technology applications:

- **Active learning is better than passive** – use clickers to engage students with meaningful questions. The professor could poll students regarding their views on a controversial topic as a way to introduce a related concept.
- **Learners need feedback** – use the commenting features available in software like Microsoft Word. Students could be paired up and follow a rubric to provide each other peer feedback on the first draft of an essay.
- **Organize information in personally meaningful ways** – use visual as well as textual models. Individual students could use concept-mapping software at the end of a unit to create a representation of their understanding.

*NOTE: with any of these strategies, do not assume students can use the technology. Ask colleagues who have used the same tools about the need for training. If necessary, allow time for students to get up to speed.*

When cooking, we don’t think of particular spices as inherently effective. They need to be used in appropriate amounts, added at a certain time, and combined with the right ingredients. In the end, the resulting dish will appeal to some and not others. You can also unwittingly make inappropriate choices, like offering spicy food to someone with a sensitive tummy, or serving sweets to a diabetic.

Instead of “PowerPoint is terrible,” let’s send a message to the most abusive presenters: “that was a terrible way to use of PowerPoint.” Instead of “clickers are great,” let’s encourage those who use them well: “I love the way you did that activity with the clickers.” Let’s help our colleagues move away from the all-or-nothing mentality. Use a tool when it’s appropriate, not because you believe you have to use it all the time.

If you are interested in exploring the use of a new tool, don’t expect a quick fix. The technology will not automatically improve your teaching. You have to work at it. Look for examples that employ strategies known to be effective in other situations. Read about ways other people have used the tool. That’s what this collection of essays is all about!

*Technology will not automatically improve your teaching. You have to work at it.*





## References and Resources

- Thomas A. Angelo, "A Teacher's Dozen: Fourteen General, Research-Based Principles for Improving Higher Learning in Our Classrooms," *AAHE Bulletin* 45, no. 8 (April 1993): 3-13.
- Derek Bruff, *Teaching with Classroom Response Systems: Creating Active Learning Environments* (Jossey-Bass, 2009).
- Richard E. Clark, "Reconsidering Research on Learning from Media," *Review of Educational Research* 53, no. 4 (1983): 445-59.
- Robert B. Kozma, "The Influence of Media on Learning: The Debate Continues," *School Library Media Quarterly* 22, no. 4 (Summer 1994): 233-39
- Edward Tufte, "PowerPoint Is Evil," *Wired* 11, no. 9 (September 2003)

## Images

- "Death by Powerpoint" by Alexei Kapterev.  
<http://www.slideshare.net/thecroaker/death-by-powerpoint>
- "Learning Guaranteed Truck" by the author.  
Created at <http://says-it.com/deliverytruck/>
- "my leatherman" by Kevin Vertucio.  
<http://www.flickr.com/photos/kev-inv033/182587939>

## The Learning Technology Consortium

The LTC began in 1998 as a partnership of institutions with similar instructional goals, strong technology and faculty support programs, and an interest in collaboration around teaching and learning with technology. The members are:

- University of Delaware
- University of Florida
- University of Georgia
- University of Maryland
- University of North Carolina at Chapel Hill
- University of Notre Dame
- University of Pittsburgh
- Virginia Tech
- Wake Forest University

Representatives meet semiannually at one of the institutions, where members tour specialized facilities and discuss the selection and use of learning technologies, benchmarking, and collaboration.

[www.learningtechnologyconsortium.org](http://www.learningtechnologyconsortium.org)