

Principles of Humility in Educational Technology

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Educational technology will become a component of substantially all undergraduate and graduate education. This is not triumphalism so much as an observation about long trends; digital tools are spreading into education because they are spreading into everything. Although these tools are becoming ubiquitous, their arrival has been erratic. Email existed for twenty-five years before it became a normal part of academic life; digital projection took decades to supplement whiteboards and blackboards; for all the current excitement about virtual or augmented reality, no one knows when or in what form they will become useful. The inevitability of educational technology, coupled with the variability of its integration, argues for humility in implementing new tools. We should be humble as we try to implement change, partly because of the unpredictable way technology matures, and partly because of the nature of our particular institutions.

No one knows how higher education works. This is not despair so much as a summation of existing research. Even after enormous time and effort studying how students achieve competence, there are very few unambiguous links between academic inputs and student learning. As Pascarella

and Terenzini put it in their decades-long literature review, *How College Affects Students*:

When student precollege traits were controlled statistically, only three variables had statistically significant, positive associations with standardized measures of achievement across at least two independent samples: frequency of student-faculty interaction, degree of curricular flexibility, and faculty members' formal educational level. It is important, however, to underscore that the magnitude of these associations was quite small and perhaps of questionable practical importance.

Despite all of our work on teaching strategies, assessment strategies, grading strategies, and the like, when we measure individual interventions, they are almost all ‘small and perhaps of questionable practical importance.’ Yet when we study the overall life outcomes of college graduates, they excel on nearly every measure — employment, health, income, longevity. Higher education improves our students’ lives, reliably and significantly, but no one has isolated what it is we do that creates that improvement.

It’s complicated even trying to figure out what college improves. Pascarella and Terenzini cluster research on the effects of college into seven vectors, only one of which is “Achieving competence,” the characteristic most associated with formal instruction. Others, like learning to manage emotions, or developing identity, purpose, or integrity, have no obvious locale or input, yet are clearly important effects in both undergraduate and graduate instruction. Many adults, reflecting

on moments of personal transformation during their years of study, observe that these moments were rare, occurred in unpredictable settings, and often took place outside the classroom.

This is the great curiosity of higher education. We have a system that benefits our students. It is stable and repeatable — we offer classes and issue degrees every year, and many schools have done so for centuries — and society continues to value them. Despite this, we have only a general idea of how and why we produce the value we do. Meanwhile, the design of our current practices, such as the structure of courses and semesters and majors, have been more evolved than planned. In this environment, those of us interested in using technology to improve education face the obvious dilemma: if we don’t know exactly how our institutions produce value, it can be hard to know where to modify our current practices. Given this lack of an instruction manual, we should at least operate with a set of principles about when and how to use technology to educate.

Any such principles should start with the core truth of learning, best expressed by Herbert Simon: “Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn.” Far from being something we can buy, educational technology is — only — something we can offer. Whether any given tool ends up being educational is a matter for faculty to attempt, and students to validate. (The general case is that *teaching* is only something we can offer, but *learning* is never guaranteed. Technology does nothing to change that.) In addition, a tool does not need to be labeled “educational” to aid

learning — when we survey students about the tools they find helpful, Google, Wikipedia, and YouTube frequently top the list.

It would be better if faculty were to abandon the label educational technology altogether, and talk instead of the experiences we want our students to have. The way educational technology can help a student learn is no different than the way books or projects or labs or problem sets can help: **by influencing what the student does or thinks.**

Given all this, it would be better if faculty were to abandon the label educational technology altogether, and talk instead of the experiences we want our students to have. The way educational technology can help a student learn is no different than the way books or projects or labs or problem sets can help: by influencing what the student does or thinks. Faculty never talk like this, of course, because we're so familiar with existing practices. We don't tell students "I want you to have the experience of reading a book" — or doing a problem set, or writing up the results — but that's what the activities in a course are. Indeed, per Simon, that's *all* those activities are: experiences that might influence the students. An assignment is an experience. A syllabus is an ordered list of experiences. The course is the sum of the actual experiences. If we start thinking this way, it becomes easier to imagine principles for when and how to use technology.

The first principle is obvious: ***We should only use technology if it usefully affects what the student does or thinks.*** Digital tools are not inherently engaging — the vast majority of websites and mobile apps ever launched failed. Likewise, EdTech companies (so-called only because they sell technology to educational institutions) cannot put education in at the factory. Only faculty can weigh the possible advantages of using any new tool in our classes.

The second principle balances novelty and continuity: ***We should add new experiences liberally, but remove old ones cautiously.*** Just because new activity might be useful does not mean that the old ones have become useless. This is true of technologic change generally; new tools almost never replace old ones all at once. Even after email appeared, the fax hung on for signed documents, and so on. Our students will be better off if we add new activities alongside existing ones, not least because we will need a comparative basis to say what's working and what's not.

Next, when we are using new technologies, ***we should maintain a varied diet of activities.*** Existing classes offer students a mix — listening to lectures, reading, writing, in-class discussion, small group work, and so on. Faculty are so accustomed to these, we don't even notice when we switch from lecturing to QA to moderating student conversation, but the hallmark of a good class is having more than one kind of engagement on offer, sometimes at the same time. We have to preserve this variability with our new tools. No technology, whether VR or group-created documents or online conversation, is so good it can be the sole experience students have.

In this varied diet, ***we should preserve human contact.*** We now know, from the decade-long MOOC experiment, that there are a number of people who, if given high quality materials, can create an incredible education for themselves. That number is around 2%. Everyone else needs human contact, for motivation and for focus. Another of Pascarella and Terezini's findings is that "the extent to which peers and student groups are seen as friendly and supportive and to which faculty are seen as approachable, helpful, and encouraging that have the most important positive implications" for student benefit from college. That does not change with digital tools, because we are the same analog people. Digital tools should support contact between student and teacher, and among students, because all education should support those things.

Finally, we need a meta-principle, because no one gets this right the first time. ***We should keep talking about our choices.*** Every major success in integrating technology into complex human settings takes time and constant adjustments — the technology gets modified to fit the people, even as the people adapt to the technology. The twin risks of implementing new technology are hubris and complacency — either congratulating ourselves on our success in advance of testing, or being satisfied with whatever results we get. The only way to guard against these is to build in the opportunity to talk about what works and what doesn't, with our peers and our students.

These principles are not an argument for proceeding slowly. They are an argument for proceeding incrementally. A professor can test many

small changes (technological and otherwise) over the course of a semester, and this style of experimentation allows for rapid expansion or removal of new techniques, even within a single semester. Incremental implementation also saves everyone from the risks of 'all or nothing' efforts. When faculty, departments or institutions commit to sudden, wholesale change, the ability to learn from that change is reduced, not increased. The sudden adoption of Udacity courses in San Jose State in 2013 was so disastrous that the entire program was scrapped. San Jose went back to status quo ante, and Udacity exited higher education entirely. No one benefitted from the aggressive implementation — least of all the SJC students, who failed their math courses in record numbers. (Don't try all or nothing development if you can't stand getting nothing.)

The integration of technology throughout the academic enterprise, including in our classes, will not be optional, it will not be minor, and it will not be quick. Every institution is going to work through these changes over time, because the reimagining required is too pervasive to relegate but too complex to get done all at once. Faculty work in large, complex institutions whose inner workings are often somewhat mysterious, even to us; we will inevitably end up crossing the river by feeling for stones. We should approach the integration of new technologies into our practices with those realities in mind, and proceed with humility as we sort out what works from what doesn't. Implementing these changes will humble us anyway, so we might as well proceed with that in mind. ■