

The birth and death of curricula

Geoff Norman¹

© Springer Science+Business Media B.V. 2017

In my travels I occasionally get invited to a medical school to consult on their new curriculum. I dread these times. It's very hard to reconcile the findings of educational research with specific aspects of a curriculum. Sure, we can babble on about Test-Enhanced Learning or Team Based Learning or teaching clinical reasoning. But the mismatch between our findings in controlled experimental settings and the real world of the curriculum is much like the gap clinicians speak of when they try to apply the findings of the clinical trial, carried out on a highly selected, homogeneous subset of patients, to the patient in front of them who misses the inclusion criteria by a mile.

Perhaps it's just me. I've never aspired to be a curriculum developer, and haven't read much at all around curriculum development. But from time to time I do reflect on the whole issue of curriculum change. First of all, what are the conditions that lead a school to decide, all of a sudden, that the time is right to expend a lot of resources and people capital toward developing a new curriculum? Sometimes it's external—a bad accreditation visit is a great catalyst for change. But more often it seems to be just a general malaise or disenchantment sets in. People may advance specific concerns—too much (or not enough) pharmacology or anatomy, insufficient clerkship time for primary care. But these don't explain it, since they could be resolved without turning the world upside down. Somehow the impetus seems to be more widespread, and also less clearly articulated.

And once it's been decided, where do they go from there? Well, one place they don't go is the educational literature. And perhaps not surprising, since I can't imagine how someone in this predicament could possibly make enough sense of the literature to provide a clear direction for change. We in education do advance fond hopes that curriculum decision-making should be more evidence-based. But honestly, it would seem to me a mind-boggling task for someone who does not spend their professional life trying to keep

✉ Geoff Norman
norman@mcmaster.ca

¹ McMaster University, Hamilton, ON, Canada

on top of developments in education to try to extract sufficient evidence from the literature to provide any kind of clear direction. Of course, this suggests an alternative; a stop by your local office of educational research and development, where some people **do** spend their professional lives keeping up with this literature. The first problem is that most schools don't have one. And of those that do, most are arms of the Dean's office and are likely busy with day to day operations—test development, curriculum planning, faculty development, instructional technology, to really keep abreast of the literature. And for the minority of schools who do have access to a quality office of health sciences education, when they venture into those hallowed halls, they are likely to find that the faculty are preoccupied with doing their research, supervising their grad students, teaching their courses, etc. Although we educational researchers bemoan the fact that much educational decision-making appears to occur in the absence of evidence, we may have only ourselves to blame.

So how do educational leaders make choices about possible new approaches?

We have really very little idea how this happens. We do know, as a result of some recent scholarship by Virginie Servant (2016) at Erasmus, that the original design for PBL at McMaster was by and large atheoretical. While it has been speculated that the ideas emerged from scholars like Dewey and Bruner, our founding fathers never heard of them. About as close as we got to a causal link was that the idea of using problems came about because one of the founders spent a weekend at Harvard Business School with an old fraternity brother, and heard about the Case Study Method (Servant 2016, p. 97). The McMaster curriculum was developed by clinicians and basic scientists. The first recognition of a potential role for education scientists was the formation of the Program for Educational Development, which did not occur until 1971. Its first three employees, including me, were hired at the staff level and had no or little formal training in educational research. As Servant says:

The people at McMaster had a wide range of beliefs about education. What they did not have, however, was an understanding about the science of learning. P.160

The other school that was the subject of Servant's thesis, Maastricht, was quite a different story. Maastricht's founders included some very highly regarded educational psychologists—Wijnen, Schmidt, Bouhuijs and later van der Vleuten. The immediate consequence was that from the outset Maastricht's educational innovation was accompanied and enriched by continuing research and scholarship in education. In the long term, Maastricht has contributed far more to the literature on PBL than McMaster. A quick journey into Web of Science showed that of the top 50 cited papers on PBL, 15 were from Maastricht authors and 5 from McMaster. I am quite certain that if we restricted our search to empirical studies, the imbalance would be even more dramatic. It seems to me that the history of Maastricht represents one of very few demonstrations of curriculum development that deliberately and intimately linked theory and practice, practitioners and researchers.

And what happens after the new curriculum is put in place? Why is it that the average curriculum has a useful lifespan of about 10 years before it gets dumped and another curriculum replaces it. McMaster is no exception, by the way. Despite a reputation for having **THE** PBL curriculum that all should emulate, we have, in fact, had 4 drastically different PBL curricula in 40 years; one every 10 years. And like the girl in the nursery rhyme, when they were good they were very, very good, and when they were bad they were horrid. (Maastricht is an instructive counter-example. Discussions with people at

Maastricht suggest that their curriculum has remained largely unchanged since its first conceptualization. We will return to this point later.)

It was the last attempt at curriculum change that provided me with some firsthand experience of the (mis)adventure of curriculum change. About a decade ago. The new dean, John Kelton, brought me into his office and said something along the lines of “We’ve been resting on our laurels for 3 decades (actually, as I indicated, those 3 decades covered three curricula). It’s time for a new curriculum. And anytime I ask people about education, they say ‘Go talk to Geoff’. So Norman, design me a new medical school.”

Well, it was exhilarating and terrifying in the same breath. An optimist would say that I was presented with the opportunity of a lifetime to put into practice many of the educational theories and findings that I have spent my professional life examining. And a pessimist would say that I was on the verge of being dropped into a huge sinkhole with no easy exit.

It did turn into a unique opportunity. And along the way it led to more observations and questions about the natural history of curricula. I began by asking myself a simple question, “You know fairly well how Problem Based Learning came about,” I said to myself, “But you also profess to know a lot about how people learn. In light of what you now know about teaching and learning, how would you do it differently?”

My next stop was to get Alan Neville, who had run the program for years, as a co-conspirator. We then assembled a group of friends who met for two years, in people’s living rooms, late into the night, with ample quantities of cheese and cabernet (mostly Alan’s), and ample discussion. The details don’t matter; they’re described elsewhere (Neville and Norman 2007). But a key idea was that the curriculum should be structured on building associations of concepts, in line with the contemporary cognitive psychology notion of human associative memory. To achieve that, we began by identifying all the important concepts, then organizing them in a logical sequence, and finally devising problems that would illustrate the concepts. The prototype was the Oxygen unit, where we basically followed an oxygen molecule through the body from the upper airway and back again. Along the way students went from respirology to hematology to cardiology. But lung cancer, ischemic heart disease, leukemia were left for another day.

After 2 years the curriculum proposal was brought before the existing undergraduate committee—all 54 of them. After some discussion, 53 were in favour of the change. So somehow, there was a general feeling that the curriculum was in need of a radical overhaul, despite perfectly respectable performance on the usual indicators like licensing exam failure rates. Again, the mystery of “Why now?”, and the only answer was that the Dean decided it should be now. But it was clear that he was capturing a groundswell of concerns shared by many faculty.

Two more years and the new curriculum was rolled out. Already there was slippage. Some of the carefully crafted innovations were no longer recognizable. A modular approach to disciplines like health economics, epidemiology, policy analysis, psychology, had mutated into a Professional Competencies unit, with modules like Wellness, Mindfulness, Leadership. Already in handing over the new curriculum to a new cast of characters who were not there through the original discussions, we had let loose unintended consequences. Not that the new approach was necessarily worse than the old, but it clearly was not what was intended.

Flash forward a decade. Last week I was sharing a wine with some medical students. With some disquiet, I asked them about the new curriculum, specifically the oxygen unit. It emerged that at some point the order of disciplines was switched so cardiology occurred

before hematology. The student at the time thought that it would make more sense to do hematology first.

But somehow the change occurred. No doubt there was some good reason to do it. But whatever the reason, it would not have occurred if the decision-makers understood and bought into the original design of concept sequencing. Whatever the reason, the change ran directly counter to the underlying philosophy and theory that led to the curriculum in the first place.

So as we continue to try to understand the natural history of curricula, we see how changes—slippage—from the original conception arise almost the moment it's out of the box and then accelerate until, presumably, the beast no longer resembles any coherent approach to learning, and it is killed off and a new one begins.

What is particularly distressing, though, is that we have very little, if any, evidence that new curricula are any better than old ones. Even such a radical and energizing curriculum as PBL does not lead to uniformly better outcomes (Hecker and Violato 2008). Somewhere I read that, if you examine student outcomes, 3% of the difference is due to curricula, 7% to teachers and 90% to students. And that's in K-12 education; I suspect that curricula play even less of a role in health professions, where students are so highly selected.

Maybe it's OK that curricula don't much matter... Maybe it's the act of curriculum reform, not the reform itself, that matters. Maybe the fact that the reform energized so many faculty members (and no doubt alienated a few) is sufficient reason to engage in the process.

But if that's the case, is this really a good use of scarce resources? After all, we typically do not invest resources into new drugs unless they hold promise of being better than the old ones (or unless they're going up against a competitor's product). What is particularly galling is that the past few years have seen a renaissance in education, where interventions originating from solid theories of learning have shown large and replicated effects (Issa et al. 2011; Dunlosky et al. 2013; Larsen et al. 2008). Yet by and large, these rarely get past the demonstration stage. By contrast, I think it would be very difficult to mount any evidence that today's curricula are, by any measure, better than previous iterations.

It seems to me there is a real opportunity for the educational research community to adopt a leadership role and engage in curriculum reform in a meaningful way, so we don't continue the model of endless epicycles. The researchers win; they show their institution that their research has value to the community. The educational leaders win; they got to show that their reform resulted in more than a transient blip in a student happiness index. And the students win as we deliver an educational approach that will result in more effective and more efficient learning.

References

- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14(1), 4–58.
- Hecker, K., & Violato, C. (2008). How much do differences in medical schools influence student performance? A longitudinal study employing hierarchical linear modeling. *Teaching and Learning in Medicine*, 20(2), 104–113.
- Issa, N., Schuller, M., Santacaterina, S., Shapiro, M., Wang, E., Mayer, R. E., et al. (2011). Applying multimedia design principles enhances learning in medical education. *Medical Education*, 45(8), 818–826.

- Larsen, D. P., Butler, A. C., & Roediger, H. L., III. (2008). Test-enhanced learning in medical education. *Medical Education*, 42(10), 959–966.
- Neville, A. J., & Norman, G. R. (2007). PBL in the undergraduate MD program at McMaster University: Three iterations in three decades. *Academic Medicine*, 82(4), 370–374.
- Servant, V. F. C. (2016). *Revolutions and re-iterations: An intellectual history of problem-based learning*. Ph.D. Thesis, Erasmus University.