

Teardowns, Historical Renovation, and Paint-and-Patch: Curricular Changes and Faculty Development

Andrew ZIEFFLER and Nicola JUSTICE

When Nicola and I agreed to write a discussion for George Cobb's paper, "Mere Renovation is too Little too Late: We Need to Rethink Our Undergraduate Curriculum from the Ground Up," we knew that one of the more difficult tasks would be to respond in under 1000 words. The first thoughts we had after reading Cobb's paper were... "we agree that the current consensus undergraduate curriculum George refers to is out-of-date and needs to be up-dated." The second thought, almost instantaneously thereafter, was, "how will such a change happen, particularly given all of the potentially affected stakeholders?" (faculty, students, alumni, administration, client disciplines, etc.) And the third, much more cynical thought, after several minutes of discussion was, "this may be impossible."

As we cogitated over Cobb's vision, we kept returning to the seemingly difficult question of how to get stakeholders to buy-in to the immense amount of work involved in curricular revision. Curriculum of any kind is a statement about the values and cultural norms of a discipline. It is the educational process through which aspiring members of the profession gain knowledge, skills, values, habits, and attitudes. Curricular revision is at its best difficult, and can be quite controversial due to the conflicting views that inevitably emerge, and in some cases may even be divisive (e.g., the reading and mathematics wars; see Schoenfeld and Pearson, 2009). All that being said, George has an uncanny ability to illuminate the large problems that need solving in the discipline and motivate others to rise to the challenge of making the "impossible" possible.

We envision that realistically, any kind of lasting change of the type Cobb is proposing will occur, initially, at the local level. If so, then perhaps it is fitting to ask: (1) does my institution's curriculum need changing; and (2) if it does, what level of curricular revision is palatable to local stakeholders?

In answering the first question, ASA's *Curriculum Guidelines for Undergraduate Programs in Statistical Science* (Horton et al., 2014) and Cobb both offer compelling reasons that most institutions' statistics curricula need revision. But, we hope it is also in the nature of any particular statistics program to collect the evidence needed to evaluate their own situation; as Reagan said, "trust... but verify." There are several questions that can guide the collection of data, depending on what the local stakeholders value. For example (adapted from Preskill and Catsambas, 2006, pp. 101–103),

- What are the objectives for the curriculum, and is it achieving those objectives?

Online discussion of "Mere Renovation is Too Little Too Late: We Need to Rethink Our Undergraduate Curriculum From the Ground Up," by George Cobb, *The American Statistician*, 69. Andrew Zieffler, University of Minnesota, 167 EdSciB, 56 East River Rd., Minneapolis MN 55455 (Email: zief0002@umn.edu). Nicola Justice, University of Minnesota Minneapolis, MN.

- What are the needs of those closest to the program (e.g., students, faculty, etc.), and is the current curriculum meeting those needs?
- What are all the effects of the current curriculum on students, including any side effects?
- What are the local and more global arguments for and against the current curriculum (cost–benefit)?
- Would an educated consumer (student) choose to study under the current curriculum?

If the data collected support curricular revision (and we sincerely believe it most often will), then it follows to consider the second question, regarding extent of the needed revision.

Using his real-estate metaphor, Cobb proposes a "tear-down" of the undergraduate curriculum—a complete gutting and rebuilding. Unfortunately, as Robin Lock reminded us in his 2005 discussion at the Joint Statistical Meetings, most attempts at curricular revision are not complete tear-downs, but rather, "paint-and-patch," fixing a few things that didn't work quite so well; mostly just sprucing things up. Cobb recognizes this, pleading that, "we do more than just graft a single new 'big data' unit onto an existing course." Of course, there is also something between these two extremes, a "remodel" akin to leaving the over-arching structure in place, while updating some things, rebuilding others. There is potential for "historical preservation"—trying to save structures and architecture, while at the same time updating and renovating, all while spending more resources than it would have taken to tear-down and rebuild. Granted, such an approach may be easier to navigate, politically.

When choosing a model of curricular change, it may be appropriate to revisit some of the evaluation questions listed above, but with more focused consideration on changes in the curriculum. For example,

- What are the needs of those closest to the program, and what scale of curriculum changes could meet those needs?
- What are all the potential effects of changing the curriculum on students (and faculty), including any side effects?

Other guiding questions may be:

- What can our faculty and staff afford in terms of time?
- Is there financial help available from the institution?
- Are there parts of the curriculum that can be saved or retained?
- What kind of construction debris are we willing to accept while we do the revision?

- How will the changes eventually impact curricula to prepare students (high school) and to follow up (graduate studies)?

It is imperative in making and considering curricular changes that we also consider how those changes could affect the development of current and future teachers of statistics. There are many academics that are comfortable teaching the consensus curriculum. How will the community help them to teach potentially new courses that include content with which they are drastically less familiar? And, are those faculty members willing to engage in this preparation? It also may be that the changes in content may need to be accompanied by changes in pedagogy; faculty may need to transition from “let me, the expert, tell you” to an approach of “let’s learn this together,” an approach we acknowledge is far less comfortable for many instructors.

Finally, the rapid change we have observed in the discipline, especially in the last 10 years, make the curricular changes Cobb proposes more urgent, and at the same time, more difficult—it is easy to imagine that by the time a curricular revision is finished it could be almost immediately out of date. It may well be worthwhile to consider how to establish flexibility within the curricular structure to accommodate the inevitable changes that will continue to accompany the evolving discipline.

While the challenges Cobb lays out are numerous, the goal is admirable, and is worthy of deep thought and reflection. Using the tools of our discipline—data and analysis—we should be able to critically evaluate our current statistics curricula and make quality, informed improvement to them. How this occurs will no doubt be at the heart of many future conversations and scholarly debate, but with this paper, George has certainly begun that discussion.

References

- Cobb, G. (2015), “Mere Renovation is Too Little Too late: We Need to Rethink Our Undergraduate Curriculum From the Ground Up,” *The American Statistician*, 69.
- Horton, N., Chance, B., Cohen, S., Grimshaw, S., Hardin, J., Hesterberg, T., Horerl, R., Malone, C., Nichols, R., and Nolan, D. (2014), “Curriculum Guidelines for Undergraduate Programs in Statistical Science,” American Statistical Association. Available online at <http://www.amstat.org/education/curriculumguidelines.cfm>.
- Preskill, H., and Catsambas, T. T. (2006), *Reframing Evaluation through Appreciative Inquiry*, Thousand Oaks, CA: Sage.
- Schoenfeld, A. H., and Pearson, P. D. (2009), “The Reading and Math Wars,” in *Handbook of Education Policy Research*, eds. G. Sykes, B. Schneider, and D. Plank, New York: Routledge, pp. 560–580.