

Editorial



While almost everyone agrees that engineering education is overdue for significant change, almost no one knows how to bring it about. In 2014, Mark Somerville and I wrote *A Whole New Engineer: The Coming Revolution in Engineering Education* (2014) and suggested that a key reason for our collective lack of success is because, as a group, we typically change the wrong stuff—content, curriculum, and pedagogy—when the real problems are cultural and emotional in nature. Moreover, we concluded that this emphasis on what to change also obscured the importance of change process and leadership. Going back as far 2012, I created a successful series of workshops and talks on Personal and Organizational Change Agency (subsequently called *Change That Sticks*) in Singapore to Brazil to the Netherlands to Australia, back to the US and Canada, and points in between; these workshops have led to important transformations at a variety of engineering programs worldwide.

Earlier last year, I received a call from colleagues at the Universidad de los Andes in Bogota, Colombia asking if I would help them create a new curriculum for their Systems and Computation Engineering Department. I gave my usual spiel about content, curriculum, and pedagogy not being the real problem, how culture and emotion were the real problem (and blah, blah, blah and so on), but my colleagues insisted that curriculum change was their mission. I tried to suggest that we needed to “soften” up the faculty with some change and soft skills workshops, and in that spirit, I asked, “How many years do we have to get transformative results?” and my colleague replied, “Two months.” After I picked myself up off the floor, Tom Cruise and the *Mission Impossible* movie series came to mind, but I got over the shock of the short time fuse, sat down (still skeptical that the aims of the project could be accomplished this quickly or well), wrote a proposal (Goldberg, 2019) for what I called the 4 Sprints Method (4SM), and the rest is history. Starting in April 2019, much to my surprise, in roughly 5 short months (not 2), my colleagues were able to make significant, transformative changes in their curriculum, without major political infighting, with learning and innovation throughout, and with a major positive shift in the mood (the culture and emotion) of the program. Looking back, I can see how the pieces of the earlier change leadership and skills workshops working together with several new elements formed a powerful, new approach to transformative curriculum (and culture) reform.

Since that experience, I've been reflecting on what I call, the narrative of slow: the idea that curriculum change takes years, is painful, and results in small changes to the status quo. And the reason we believe this story is because many of us have lived the pain of traditional curriculum change, but I believe the lessons of Bogota are generally applicable, and simply stated are the following

With proper process and mood, rapid curriculum change is possible.

Notice that the condition here is twofold: proper process and mood. In looking back at the Bogota experience, I have realized that the process allowed for both rational and emotional co-discovery of a new path by many, if not most, of the UniAndes participants.

This is not the place to deconstruct how this was done, but I thought that the readers of JEET would want to know about the possibility of rapid change in months not years. We are looking for candidate programs or schools that are interested in the possibility of rapid, effective curriculum change. Continued work will help us streamline the method and better understand how it works in different cultures and different types of institutions. Write to me at deg@threejoy.com to learn more about the method and whether it can help your program leapfrog the status quo to something at the cutting edge.

More work remains, but the success of this pilot effort suggests that we can change content and curriculum, and culture and mood in a short time, with a well-defined process, one that may be fairly generally applicable. For many, if not most JEET readers, this should be a welcome prospect.

Bio:

David E. Goldberg (Dave) is an artificial intelligence pioneer, engineer, entrepreneur, educator, and trained leadership coach (Georgetown). He taught engineering at Michigan, Alabama, and Illinois for 27 years, and as an academic, was known for his work in artificial intelligence (AI), particularly genetic algorithms and evolutionary algorithms, amassing an h-index $h=102$ (here), including 5 authored texts, a number of edited volumes, and the highly cited *Genetic Algorithms in Search, Optimization, and Machine Learning* (Addison-Wesley, 1989). During his career he co-founded a Silicon Valley startup (www.sharethis.com), 3 academic conferences, including one combining philosophy & engineering, and an educational transformation incubator.

In 2010, Dave resigned his distinguished professorship and tenure at Illinois to go out into the world to help transform higher education as a result of the surprising success of the iFoundry (Illinois Foundry for Innovation in Engineering Education) initiative at the University of Illinois at Urbana-Champaign (UIUC). Bootstrapped in 2007 in reaction to a suggestion to form yet another faculty committee to “study” engineering education, Dave refused the committee assignment and instead took immediate action and formed and led iFoundry as a bottom-up incubator for educational change. The off-the-books effort was made an official college activity in 2008 and it successfully elevated Illinois's educational culture, giving faculty permission to work for educational change and giving students reason to expect more engaging & unleashing educational experiences.

Dave now heads www.ThreeJoy.com, a coaching & change leadership firm for higher education, and www.BigBeacon.org, a 501(c3) non-profit corporation devoted to transforming engineering education around the globe. His most recent book, *A Whole New Engineer: The Coming Revolution in Engineering Education*, is changing engineering education norms and practices around the world and was made available in a new softcover edition in late 2019.

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