

Interview with Doug Hall on the Role of Training in Innovation

by Margo Lukens

In this interview with Margo Lukens, Doug Hall gives his current thinking on the teaching of innovation and the urgency for doing so. Hall has been working in the field of innovation for most of his career. He has served as partner and mentor in the University of Maine's program, which offers an Innovation Engineering minor open to undergraduate students in any major and a certificate for graduate students. Hall says that "the world of the guru is done" and that "companies, colleges, and countries need to empower their people to lead the transformation from the inside out."

PREFACE

My involvement with innovation, as well as the genesis of Innovation Engineering at the University of Maine, has stemmed from my work as an English professor—teaching, advising students, and chairing the department. In the liberal arts, we often confront questions about the utility and relevance of our subject matter to students' lives and future work in the world. When I met Doug Hall in spring 2005 and got introduced to the innovation tools and methods he was using, I felt inspired and confident that we could build curriculum to offer these tools and methods to students in any major field of study at the University of Maine. Teaching students to address problems and opportunities by diversifying their thinking, to use writing as a thinking and prototyping tool, as well as to articulate and persuade, and to use Fermi estimation and simple mathematical formulas to evaluate and refine ideas, gives them the skills and confidence to create their own future in the field about which they care the most. It also supplies them with a common language (and, again, the confidence) to engage in collaborative, interdisciplinary projects—terms that describe most inventive processes and even most businesses nowadays.

In my role as director of the Innovation Engineering academic programs, I have worked to convey the message that training in innovation skills is important for everyone. The name Innovation Engineering has made it easy to attract faculty and students from engineering programs, as well as those interested in entrepreneurship

and business innovation. However, it is really our purpose to bring these methods for creating a sustainable future to faculty and students in every field and specialization.

In the interview that follows, Doug Hall gives his current thinking on the teaching of innovation, and the urgency for doing so.

***ML:** A lot of people think that innovation and creativity are innate talents. Why do you think people have this idea? And why do you think it is possible to teach people to be innovative?*

***DH:** The belief that innovation is magic comes from a lack of education in how ideas are created. Research finds that there are some simple principles that explain how ideas are created. A study we did [at Eureka International] of 6,000 teams testing more than 30 variables, with independent evaluation of the quantity and quality of ideas, found that the creation of valuable ideas or as we brand them, meaningfully unique ideas, involves three variables. First, stimulus to spark ideas and connections; second, diversity of thought creates an exponential impact on the processing of the stimulus; and third, fear, as the greater the fear, the fewer ideas that are created.*

The cultural mindset that creativity is an innate talent is no different from when we believed that manufacturing quality was a result of personal craftsmanship. This mindset held that when there were quality problems, they were the result of bad workers.

This mindset that workers were the problem nearly destroyed U.S. industry in the 1970s. Salvation came in 1980 when statistician W. Edwards Deming of Powell, Wyoming, returned to the United States from Japan where he had taught the Japanese a systems approach to quality. Deming taught that 94 percent of manufacturing quality problems are due to the system and only 6 percent due to the worker.

Systems thinking as taught by Deming transformed manufacturing, product supply, and even our sales and finance systems. However, so far, the marketing, innovation, and leadership functions have resisted systems thinking. Much of this is self-serving, as it helps them justify being paid more than others for the benefit of their magical wisdom.

When people ask whether it is possible to teach people to be innovative, I say no. I don't think that it's possible to teach people to be creative. The very statement implies that there is something wrong within the person. Rather, I know that it's possible to teach people who are willing to learn a reliable and reproducible system for creating meaningfully unique ideas. I know it's reliable, as it is multiplying across the world at an exponential pace. In the three years since we went public with the systems approach, it has been adopted by thousands of companies, from small startups all the way to Fortune 100 companies. The value of innovations created, documented, and quantified is nearing \$200 billion.

ML: *What is the value of teaching people to innovate in the United States? In the world at large? And why is innovation of so much interest at the turn of the twenty-first century?*

DH: In economics we teach about the impact of a true free market where buyers and sellers have complete and open information about price and value. Historically, few markets have actually been true free markets. Because customers don't have full information, companies are able to find customers who are willing to pay more than they should or would if they had full information about alternatives. This lack of information allows those who are not world class to survive, when they wouldn't in a true free market.

The reason it's important to teach people to innovate today, and to think without borders, is that the Internet has moved the market closer to a true free market. In a true free market, those whose ideas are

meaningfully unique take the lion's share of the profits as a reward for their proactive leadership of innovation. Conversely, those who offer products, services, or nonprofit causes that can be easily replaced with other options, realize endless downward pressure on their price and profitability.

Historians note that this is not the first time that a shift closer to a true free market caused price decreases. At the turn of the century before last, a similar shift to free market occurred. From 1870 to 1910, customers were suddenly given greater access to information on alternatives. During that time period, customers became more aware of alternatives to those in their local area. This occurred when 5.1 million telephones were installed, railroads became a national network, the number of registered brands grew by a factor of ten, and national advertising was born. The net impact of this was a 30 percent decrease in the Consumer Price Index.

The result of the Internet free market shift is summed up in the words of Charles Dickens — “It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness,... it was the season of Light, it was the Season of Darkness, we had everything before us, we had nothing before us....” This was how I opened a lecture to the UK Marketing Society Annual Meeting at the Royal London Opera House in December, 2013. This shift in companies, colleges, universities, countries, governments, and nonprofits is not going to stop. Some will adapt and some will not.

ML: *What are the most important innovation skills to develop? What kinds of things will people do with these skills?*

DH: Deming taught that the two things you needed to know to build quality offerings were the Theory of Variance, and the Plan-Do-Study-Act learning cycle (also known as the Deming Cycle—it's a modified version of the Shewhart Cycle).

Continuous quantitative research on hundreds of thousands of individuals, teams, innovations and projects finds that there are three fundamental principles to innovation: leverage stimulus, diversify thinking, and drive out fear.

In the context of teaching Innovation Engineering (as you do at UMaine and we do worldwide), we package these principles into four classes: Create, Communicate, Commercialize, and Systems. The Create class addresses stimulus and diversity. The Communicate

class helps drive out fear by articulating the idea in a customer-focused manner (in the case of a product or service sold external to the organization) or a stakeholder-focused manner (in the case of an internal system improvement).

These classes excite undergraduate, graduate and executive education students with important learning at each level. In Create, students learn a systematic way to create ideas, the incredible power of the Internet as a stimulus tool, and the fact that innovation is not random. The Communicate course gives students the ability to use writing as a tool for thinking more deeply; they learn to motivate others through organization of their thoughts. When they get to Commercialize, they learn the power of math used as a tool for thinking about their ideas, and that it doesn't have to be scary. Best of all is the sheer joy they experience when they embrace the "fail fast, fail cheap" method of testing ideas. After the first three courses, the Systems course teaches students how to lead a major innovation project. This might be in the context of a small team or within a large organization. Because many people find themselves working in organizational contexts, it is really important that they develop the ability to map, model, invent and reinvent systems. Upon completing the sequence, many people remark on the confidence they feel when they understand the power of the whole package Innovation Engineering delivers.

ML: *What is the best way to acquire these skills? Is it different from the way one might learn another skill, such as playing the guitar or baking a soufflé?*

DH: The best way that I know is a new form of teaching called "Cycles to Mastery." It's a new teaching technology that blends competency-based learning, the Deming Cycle and control charts, Benjamin Bloom's "mastery learning" system, formative assessment, and in its best embodiment, supplemental instruction.

In brief, the system includes sequences of instructional videos, exercises to apply skills, extended exercises, case studies, and reflective writing that create never-ending spirals of increased mastery, as well as increases in the mastery standard itself. In effect, instead of grade inflation, the system drives learning inflation.

Innovation Engineering is, as the name says, a new field of study that embraces the spirit of engineering education. It's about applied innovation, not theory, it includes real world applications, and it has clear grading

standards for all assignments. Maybe most importantly, Innovation Engineering brings a disciplined, systematic mindset to innovation efforts.

ML: *So, in fact, the idea of practicing innovation skills to achieve mastery is similar to the discipline required in learning to play a musical instrument. Is there a particular age demographic on which we should focus training efforts? How might we make the case for policies supporting this education?*

DH: In my opinion we should focus our education efforts on the willing. And the willing are of all ages. I have met an 85-year-old CEO in Wyoming who embraced and applied the learning in record time. I've also met 22-year-old students who tried to game the classes.

The entire population is not ready to make the transformation to an innovation mindset. Multiple studies indicate that about 15 percent are ready to make the shift. For example, research among company managers finds that 15 percent primarily spend their time being proactive, and 85 percent primarily spend their time being reactive. These results are in line with Bass's diffusion measurements, which found that innovators were 2.5 percent of the population and early adopters (those who seek out new offerings) made up 12.5 percent.

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I believe that the role of government is to support education and infrastructure. Public education makes it financially feasible for everyone who is willing to be able to increase their impact on the world. With today's rising education costs, this feasibility is threatened. However, the drive for education will not decline. This is why I support the introduction of Innovation Engineering minors and graduate certificates at leading universities, as well as in community colleges and through employee education programs inside companies.

ML: *Should training for different age groups or industries use different approaches? What schools, organizations, or institutions should be involved? Who should be teaching, and how should the teachers be trained?*

DH: Other than the obvious difference of learning maturity—12-year-olds vs 20- and 50-year-olds—I have seen no evidence that the training content should be different for different age groups or industries. The principles being taught are fundamentals.

This is not to say that there are not unique elements in different industries. The model we are pursuing with schools is that Innovation Engineering is embedded within a broader major degree or graduate program. Innovation Engineering teaches the fundamentals. It is only, and in my mind will only ever be, a minor or graduate certificate. It is a tool for empowering someone's personal passion. For example, you can get a degree in English with a minor in Innovation Engineering. This means you know how to create, communicate, and commercialize meaningfully unique ideas in the field of English.

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There are schools that wish to go further, and there are many related fields. One university I am working with is creating new innovation bachelor's and master's degrees. In a case like this, Innovation Engineering will be embedded within the degree. The degree will then have a concentration in a related field of innovation. Examples of the concentration options include design, R&D, management, and entrepreneurship. We are also having conversations about embedding Innovation Engineering within health care administration masters programs.

When it comes to who should be teaching, my bias is towards those who are willing to embrace the

entire mindset. This can be found on campus and off. Adjunct instructors from industry who are practicing "Innovation Engineering Black Belts" bring a reality base that is invaluable. Note that adjuncts can be particularly effective teachers using the Cycles to Mastery technology, as the content is delivered via continuously refined digital videos; the teacher's role in the classroom is to be a coach to the students, which is what they do when they work as an Innovation Engineering Black Belt.

When it comes to on-campus faculty, it's very important that they do as much as they teach. This can be through doing pro bono work for nonprofits or by leading or coaching innovation projects for their university or home department. In addition, as of January 1 of this year, a path has been developed for professors to do commercial consulting work as licensed members of the Innovation Engineering Network.

In summary, to be respected by students and true to the soul of the Innovation Engineering movement, those who are teaching must also be doing. You can't teach what you are not living.

One of the smartest things the UMaine team of teaching pioneers did was to bring together cross-disciplinary teams to do the teaching. An engineer, a musician, and a writer taught the first courses. This is being true to the true power of diversity.

ML: *What is your vision for the future of innovation education?*

DH: A renaissance of professionalism is coming to innovation. Overall, Innovation Engineering is experiencing exponential growth. However, around the world it's uneven. There are places where the mindset shift has occurred and there is rapid growth. One university is training 40 of their top leaders and academics as Innovation Engineering Black Belts. They are already using the system to address their most challenging campus problems. There are other places where it's seen only as a class, a department, or a project.

Let me tell you about a phone call I had with the CEO of a Fortune 500 company. After I explained the purpose of Innovation Engineering he said, "After the last recession in 2008–2009, we came to realize that the world had changed forever. We have no choice: we have to change our culture. We don't need a few experts, we need everyone in the company engaged in this new innovation mindset."

Quite simply, the world of the guru is done. Companies, colleges, and countries need to empower their people to lead the transformation from the inside out.

When Deming was asked whether leaders were changing fast enough he would famously answer, “They don’t know about it. How could they know? How could they know? How could they know there was another way of thinking?”

The education community is under attack on its impacts and budgets. The solution is not protection of the existing way of education, but rather to be proactive leaders into the future. Consider this a personal invitation for those who want to lead the transformation to an innovation mindset. Readers can contact me directly at doug@InnovationEngineering.org. 🐙



Margo Lukens is professor of English at the University of Maine, where she has been on the faculty since 1992. Since 2007, she has been director of academic programs in Innovation Engineering at the University's

Foster Center for Student Innovation. She has served as chair and coordinator of undergraduate programs in the English department and has been a faculty associate of the Franco-American Center since 2007.



Doug Hall's purpose is to transform innovation from a random gamble to a reliable system. After working for Procter & Gamble for 10 years, he left the company to start the Eureka! Ranch, an organization that helps multinational

corporations to invent ideas for profitable growth. In 1999, he began teaching others how to invent, which led to the creation of the Innovation Engineering movement. He is the author of four books and has starred in three network television/radio programs.