

## ACADEMIC INNOVATORS



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## Culture of Impact: Faculty as Mentors for Student Entrepreneurs

THERE IS AN EVOLUTIONARY—SOME MIGHT SAY REVOLUTIONARY—CHANGE OCCURRING at universities. In the traditional “ivory tower” model, if you get grant funding, publish in top journals, and win awards, then your faculty colleagues respect you. This model is poorly suited to the multidisciplinary teams needed to translate research into products. In the evolving model, if your scholarship has a positive impact on the lives of others, you earn their respect. The key to this culture change is students and their insatiable desire to do well by doing good. Students understand that to have an impact, they have to be innovators.

Just who are the academic entrepreneurs? They are the students and faculty who seek to identify and solve real-world problems by translating basic science into applied technologies. In an editorial in *Chemical & Engineering News*, Linda Wang interviewed scientists venturing out into an entrepreneurial world (1). “When you’re doing [research and development] as an academic, you’re thinking about what’s the coolest thing you could possibly do,” reported a postdoc. “In the business world, you have to ask the question, ‘What can I do that gives the most value to somebody overall?’” *Science* collected letters from more than 150 young scientists, the NextGen Voices (2). Wrote a bioengineering student, “Scientists succeed by providing a tangible benefit to society.... [T]he most successful ones always remember that science is not just for scientists.”

The Federated Associations of Societies of Experimental Biology (FASEB) recently released the proceedings from a conference on how to increase support for translational research activities ([www.faseb.org/Portals/0/PDFs/opa/TranslationalReportFINAL.pdf](http://www.faseb.org/Portals/0/PDFs/opa/TranslationalReportFINAL.pdf)). Basic scientists engaged in translation were inspired by the possibility that their research could have a real impact on patient outcomes. More important, tackling clinical problems led to deeper mechanistic insights and research ideas. The report recommended that research institutions support greater collaboration, cooperation, communication, and respect among basic and clinical scientists. Implementing appropriate recognition and rewards for translational scientists becomes essential; tenure and promotion practices may need revision to recognize creative and nontraditional risk-taking, such as product development and efforts to move technologies toward the clinic.

### REFRAMING THE QUESTION

The question often asked in academics is, What are the metrics for evaluating faculty entrepreneurial activities in terms of retention, promotion, and tenure decisions? I believe that this is the wrong question, one that arises from the traditional model. The real question is, What needs to change to maximize our impact on the lives of people? The answers are (i) listen to your customers, the students, and the taxpayers; (ii) develop a two-tier approach, combining a top-down mandate from the university president with a bottom-up effort driven by faculty and student entrepreneurs; (iii) recognize that translational activities are intrinsically scholarly; and (iv) reward innovation and impact.

The key to reframing the question, and to developing a culture of impact, is the focus on the students. Students are why universities exist. By taking a marketing approach, curricula may be developed that teach students what they need to succeed, which may not always be congruent with what professors think they should know. We may think our job as faculty is to advance knowledge, but in the eyes of the community, the most important deliverables are companies and jobs. In this way, training and technology from the university can tangibly improve people’s lives. Students at the University of Utah, for example, can choose from more than 30 different entrepreneur-focused programs. They work as part of interdisciplinary teams, and more than 8% of the undergraduate and graduate students participate. Utah is not unique; such student-oriented programs are in place at Stanford, University of Georgia, University of Wisconsin–Madison, and many others.

Recently, a report supported by the Kaufmann Foundation (3) identified four models for how faculty and student spin-offs originated within seven private and public institutions. In three of the models, the role of the faculty member decreased with company maturation,

whereas the role of the business entrepreneur and students increased. Overall, graduate student entrepreneurs were essential in 83% of the spin-offs. For our educational system to meet student needs and market forces, faculty need to learn more about entrepreneurial activities. The students need real-world skills, and their professors should be able to teach these skills. Indeed, students should be encouraged to look beyond their labs and to take business and entrepreneurship courses in order to gain different perspectives.

### GOOD TRANSLATION REQUIRES NATIVE SPEAKERS

The translational imperative requires embracing complexity yet delivering a simple, useful product (4). Students often embrace this concept more readily than do faculty, and that is why the culture of impact is largely student driven. But translational research is only the beginning. In the emerging culture of impact, faculty members engage in translational teaching; they invest time and effort to develop educational methods that meet the practical needs of their students. In the culture of impact, professors also engage in translational “service.” We embrace activities that reach outward from the university and into the community. We help improve public understanding of science and medicine. One of the NextGen voices felt that successful scientists need to innovate, collaborate, and be flexible: “Innovators, marketing experts, financial gurus, teachers, and mentors—today’s scientists are renaissance men and women, indeed,” she wrote (2).

To convert academic technologies into products, the inventions at universities require implementation and commercialization. No technology reaches the public unless it is commercialized. Indeed, innovation requires invention and implementation; academic science is critical to both. Creating products to address real-world needs is a shared scholarly activity that places faculty and students on an equal footing as stakeholders with a common goal. Participation in translational and transdisciplinary team activities engages and excites students in a way that no lecture or lab course possibly could. To show how this can work, three Rice faculty members were inspired by an old Haitian saying, “You don’t learn to swim in the library; you learn to swim in the river.” They created Beyond Translational Borders (BTB; <http://rice360.wildapricot.org/btb>), a transdisciplinary training program for undergraduates to develop new solutions to real global health challenges. Since 2006, BTB students have created more than 58 affordable products.

### MENTORING IS A TEAM EFFORT

Mentoring students is completely different from mentoring faculty. With faculty, it’s like teaching old dogs new tricks. These are smart and versatile scientific thinkers, but they are often unfamiliar with the basics of intellectual property, regulatory compliance, and corporate governance law. In contrast, with students it is teaching the new dogs old tricks; that is, the time-honored essentials of business. Moreover, faculty members often have a low tolerance for financial risk. In contrast, students have a much higher tolerance for intellectual and financial risk. As such, students are the driving force for entrepreneurship on campus. In effect, the university is a large and diverse business incubator, allowing students and faculty to form teams to bring new technologies to the market (3). Entrepreneurism is really a young person’s game but needs experienced mentors and outside input from both peers and professors. One “stranger in a strange land” was Bassil Dahiyat, who took the plunge from being a graduate student to being chief executive officer of life sciences startup Xencor (5). Transitioning from the traditional model to a culture of impact meant broadening his educational experience and taking risks: “[D]o not fear change. You must be agile and able to adapt rapidly...” (5). Impact-oriented academic entrepreneur teams can solve the challenging problems and translate science into products that can change people’s lives.

– Glenn D. Prestwich

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2. NextGen Speaks, NextGenVOICES. *Science* **336**, 32–34 (2012).
3. W. F. Boh, U. De-Haan, R. Strom, University technology transfer through entrepreneurship: Faculty and students in spinoffs (August 1, 2012); <http://dx.doi.org/10.2139/ssrn.2125203>.
4. G. D. Prestwich, S. Bhatia, C. K. Breuer, S. L. Dahl, C. Mason, R. McFarland, D. J. McQuillan, J. Sackner-Bernstein, J. Schox, W. E. Tente, A. Trounson, What is the greatest regulatory challenge in the translation of biomaterials to the clinic? *Sci. Transl. Med.* **4**, 160cm14 (2012).
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