

What the U.S. Can Learn from Indian R&D

Engineering companies in India play a leading role in educating their research employees, a practice the U.S. can adopt to help keep its global competitive edge

by [Vivek Wadhwa](#)

We've heard the dire warnings before. The U.S. is falling behind in math and science. A recent admonition came from the Business Roundtable, which cautioned that the U.S. could lose its competitive edge to India and China unless it doubles higher education graduation rates in engineering and science. Intel ([INTC](#)) Chairman [Craig Barrett](#), a member of the influential association of executives, said America's economic future lies with its next generation of workers and its ability to develop new technologies and products. This means we must strengthen math and science education, he said. Yes, we need to keep improving education.

But too great an emphasis on education at the university and high school level lets off the hook another crucial contributor to the education of U.S. workers: the workplace.

India knows well the role companies must play in educating employees. A new report I co-authored for the [Ewing Marion Kauffman Foundation](#) titled [*How the Disciple Became the Guru*](#) reveals that Indian industry isn't relying on India's education system to gain an edge. Indian industry has developed a surrogate education system that can take workers with weak educational backgrounds and turn them into world-class R&D specialists.

Perhaps it is time for America to learn from its former disciple.

Glut of Engineering Graduates

India graduates around 200,000 engineers a year, but the quality of the students varies widely. India's main tech trade group, NASSCOM, says that only half of these new graduates are employable. Additionally, India graduates 20,000 master's degree holders and fewer than 1,000 PhDs in engineering. Those tallies aren't even high enough to staff the country's universities. (By contrast, each year U.S. universities confer 130,000 bachelor's, 50,000 master's, and 12,000 PhDs in engineering).

Yet, our research at Duke University has shown that India is rapidly becoming a global R&D hub in several industries. Its scientists are doing sophisticated [drug discovery for Big Pharma](#) (BusinessWeek.com, 6/10/08). Its engineers are designing key components of jetliners for Boeing ([BA](#)) and Airbus; developing next-generation networking equipment for companies like Cisco Systems ([CSCO](#)); and building auto bodies, dashboards, and power trains for such vehicle

manufacturers as General Motors ([GM](#)). Indian companies are also innovating for the Indian marketplace; witness the \$2,500 car by Tata Motors ([TTM](#)).

The R&D jobs that result in these breakthroughs usually require advanced degrees. And going by the graduation numbers, India's R&D machine should be imploding, not expanding. So how is India doing it?

My team traveled to India and met with chief executives, human resources directors, R&D managers, and visited the R&D and training facilities of 24 leading companies to find out. We were amazed by what we learned.

Faced with severe talent shortages, escalating salaries, and a lagging education system, Indian industry had to rethink the way it recruited, trained, developed, and retained its workforce. It started by adapting the best practices of companies that were outsourcing R&D to India. Then leading companies in diverse industries started improving on these techniques and methods; they refined and integrated them into a unified system. We found innovation in several areas.

- **Recruitment.** Résumés can fail to reflect the true aptitude and potential of job applicants and to provide a basis for comparison, and educational degrees are often not a sufficient proxy for proof of skill and competence. So leading Indian companies now hire for ability and aptitude rather than only specialized technical skills. They provide the training needed to bridge skill gaps. Instead of hiring only from top engineering universities, technology companies recruit from second- and third-tier colleges; they also hire arts and science graduates. Many companies have negotiated deals with colleges to hire in bulk; they'll automatically offer jobs to the best students; no interview necessary.
- **New Employee Training.** Companies in India assume that new recruits will have to be trained practically from scratch. So they invest substantial time, money, and effort in training. Nor is training relegated to less-experienced personnel: Even the most senior executives participate in training new employees. Most large companies have built dedicated learning centers, and some employ hundreds of training staff. They typically provide one to four months of training in a wide variety of subjects.
- **Continual Employee Development.** Leading companies mandate that employees receive between one and three weeks of training a year in areas where they are weak. Some training is provided on evenings and weekends, but most is provided on company time. Many companies tie salary increases and promotions to the completion of such training. In Satyam Computer Services' ([SAY](#)) engineering-services division, yearly training requirements have been increased from 100 to 150 hours.

Employees also receive extensive coaching and mentoring by company executives. The Indian division of Cadence Design Systems ([CDNS](#)) has a program called "Leaders as Teachers," which requires technical leaders to spend one to two weeks a year delivering classroom training. Every senior employee must participate.

- **Managerial Development.** Shortages in managerial talent have made it necessary to build pools of potential managers internally. Most companies offer extensive management training, internally and externally through MBA-type programs. Companies like Adobe ([ADBE](#)), Genpact ([G](#)) and Satyam have policies to cultivate managers internally. Satyam gives internal candidates the right of first refusal on all new managerial openings.

- **Performance Management.** Most companies have sophisticated systems that provide frequent feedback to the employees and allow employees to provide feedback on their managers. At [HCL Technologies](#), employees can even review their managers and these appraisals are available online through the company's intranet. Everyone can review employee assessments of their bosses—including their performance, strategic vision, ability to communicate, problem-solving skills, and responsiveness.

In all of the companies we studied, we found that the intense focus by senior corporate executives on implementing companywide staff-development initiatives caused dramatic improvements in productivity and performance.

Workforce development helps to explain, for example, how IT service firms have been able to increase billing rates and productivity levels and maintain high levels of growth and profitability despite skilled-talent shortages, rising salaries, falling exchange rates, and other challenges. Employee development similarly explains how companies in India are able to hire bright but largely inexperienced talent to successfully engage in R&D and other innovation.

The achievements of companies in India show that employee investment, development, and empowerment are central and critical means to building and sustaining long-term competitiveness and innovative capacities in a global knowledge economy. The U.S. can learn and incorporate these lessons from India as it rethinks how to train and develop its workforce to maintain its global competitive edge. U.S. companies have long played the guru. Perhaps the time has come for the guru to learn from a disciple.