

State Educators Raise Red Flag Over Shortage Of STEM Grads

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California teachers and educational administrators are sounding the alarm over the increasing lack of college students majoring in science, technology, engineering or mathematics, warning that the shortage could result in a talent deficit in key industries and have a chilling effect on the economy.

A report titled "Technical Difficulties: Meeting California's Workforce Needs in Science, Technology, Engineering and Math (STEM) fields" was released last month by the Campaign for College Opportunity, the Sacramento State Institute for Higher Education Leadership and Policy (IHELP) and the Bay Area Council. It found that California's colleges and universities are not producing enough STEM graduates to fill jobs in healthcare, science, engineering, architecture, accounting and computer science, occupations seen as critical to the state's \$1.7 trillion economy.

"We know that the need is very big; there's already a shortage in over half the STEM occupations that were reviewed in this report," says Michele Siqueiros, executive director of the California-based nonprofit Campaign for College Opportunity. "Our hope is really that in the middle of this huge fiscal crisis facing the State of California that we can urge our policymakers and the governor to really prioritize their investments in higher education. We know that it's inevitable that there will be very deep cuts to higher education, but we think it's very important to preserve access and minimize the impact to students being able to go to college."

Educators warn that the lack of students entering STEM fields will have a chilling effect on California's economic growth and job creation. The shortage could be so acute in coming years that it may leave many STEM-related jobs in the state unfilled, the report says.

IHELP Director Nancy Shulock says the state must respond swiftly to this challenge. "In today's information economy and California's historical position as a leader in the information economy and knowledge workers, it kind of forecasts a changing status of our state unless we take some pretty significant and quick steps," Shulock says. "We all just have to remember the phrase, 'crisis can also be an opportunity to really focus on what's most important.'"

Keeping The Technology Edge

Dr. Forouzan Golshani, dean of the College of Engineering at California State University, Long Beach (CSULB), says the lack of STEM students in the Golden State has national and even international implications.

"We definitely need more scientists and engineers in this nation, because this is what enables the nation to maintain its technology edge," he says. "A country like China produces 550,000 engineers per year. India alone produces 370,000 engineers. In the U.S., [with] all of the great engineering colleges we have combined, [we] press hard to produce 50,000, if even that."

"You can say, 'OK, the education here is far superior as compared to other countries,'" he adds. "But even if one in 10 of those engineers is up to par, then China will have the edge in the years to come [because] they will have the innovation edge."

Golshani says his school emphasizes student retention and graduation rates and is always working to increase the number of graduates by reaching out to potential students even before they set foot on campus.

"I take this problem very seriously," he says. "Enrollment increase and student success in engineering is a huge, huge initiative in our college, one that we work [on] with the school districts and the local community colleges so that students get to know about opportunities from even middle school – because they need to work on math and science – and [have] an ability to pull through a relatively difficult major."

This academic year, the college had a 40 percent jump in its number of graduates, going from 500 to 700, according to Golshani. He says even in a recession with a shrinking job market, these students will quickly find work.

"The local economy is waiting for this upsurge," he says. "Companies like Northrop Grumman and Boeing, they have a very sophisticated modeling mechanism for their HR, so they know how many they have to hire in the next year, three years from now, five, even 10 years from now. . . . We would like to be able to produce an adequate number of fresh graduates so that different companies can select what they need."

During the next decade, employment in STEM-related occupations is predicted to grow faster than other employment sectors. Experts say between 2006 and 2016, there will be on average approximately 46,100 job openings in STEM occupations, the report predicts.

At CSULB, Professor Henry Fung is already training the next crop of STEM grads, overseeing 30 students taking part in the summer "Bridges to the Baccalaureate" program, a national initiative sponsored by the National Institute of General Medical Sciences. The program helps students transition

from two-year colleges to four-year degree programs in the sciences.

This summer, participants include students from Long Beach City College (LBCC), Cypress College and Cerritos College.

“Studies have shown that the critical grade level if a student is entering the sciences and mathematics is actually fifth-grade,” says Fung, who attended the California State University system and has a doctorate in microbiology in the area of immunology. “If they are not beginning to prepare to take the appropriate classes and work their way up, then it will be harder for them.”

Fung says college educators should work with high schools to ensure that students interested in STEM fields take the appropriate mathematics and science courses so that when they graduate, they’ll be prepared to begin college-level classes in those subjects. “We need to look at [it] . . . as a continuum,” he says. “All the way through elementary through middle school, high school, whether it be community colleges, four-year colleges, looking at it in terms of entering graduate programs and earning the degrees that would allow them to participate in these careers.”

Eloy Ortiz Oakley, president-superintendent of LBCC, says his school is encouraging students to enter math and science fields and has seen success in the rising number of students preparing for healthcare-related fields. But he says more work needs to be done.

“There’s been a lot of attention on the healthcare field, with a lot of [it] placed on the job pathways that exist,” he says. “For example, nursing programs here at [LBCC] and [CSULB] and across the state have huge waiting lists to get in because we have done a good job of showing people that there is a great potential for a good career on the other end. . . . With regard to the other STEM fields, particularly engineering – and of course engineering relies so heavily on math and some of the other sciences – we have not done a good job of late. We have sort of resigned ourselves in the nation, and particularly in California, to getting those resources from other countries like India and China. Now that those countries have their own economies to feed, we’re now scrambling to grow our own engineers.”

LBCC transferred 1,443 students to four-year institutions last year, according to LBCC Interim Director of Media and Public Relations Mark Taylor. That represents an increase of about 140 students, or roughly 10 percent, from the year before, and school officials expect this year’s transfer number to be even higher.

“There’s no one silver bullet,” Oakley says. “We’ve got to work on a number of issues – first and foremost, continue to improve science and math education in K-8 because, really, that’s where the initial work, the heavy lifting, has to begin to take place.”

“I do think that Long Beach Unified [School District] is sort of an example of progress being made, but unfortunately we find ourselves in a position where we’re so far behind, we can’t just make incremental improvements,” he adds. “We’ve got to make major improvements if we’re going to provide the kind of workforce that [can] meet the needs of our current and future economy.”

Oakley says the state’s community college system needs to reform itself and focus on preparing students to succeed in math and science, mapping out clear pathways for students so they can successfully transfer to four-year schools and pursue degrees in STEM fields.

“If you look at countries like India and China, they’ve done a magnificent job, and there’s no reason why we can’t do the same,” he says.

Reaching Out To Women And Minorities

Educators such as Oakley and Golshani both agree on the need to increase the number of female and minority STEM grads, a demographic that has not traditionally pursued degrees in these fields in large numbers.

“Unfortunately, we’re almost deprived of 50 percent of the population, because 50 percent of the population does not consider engineering as an option,” Golshani says. “This is an unfortunate phenomenon [because] it deprives the field of engineering from many, many intelligent [women] who could be contributing very substantially to the field. . . . Engineering is all about design, designing new solutions, finding new solutions to problems, and women are really good in design, and yet we’ve made very little inroads in making engineering a field that women feel comfortable in. So we need to correct that and . . . to let young women know that engineering indeed is a very good profession for them to pursue.”

“I tell my own daughter, who is studying engineering, this is the ticket to women’s independence,” he adds. “These are high-paying positions that ensure women of having an independent life.”

Attracting high school graduates of color who will study STEM fields is a high priority at LBCC, where more than 50 percent of the student body is from Latino, Pacific Islander, and African-American backgrounds.

“We get to see the future here at [LBCC],” Oakley says. “We get to see all the students who will become the workforce of tomorrow, and I think we’re facing some real challenges because we’re not doing a good enough job in this state of graduating enough students either out of community college or out of the university system, particularly students of color. Those students of color are increasingly becoming the backbone of the workforce in California, so I fear for the future of the state’s economy if we can’t do a better job of educating [them].”

Battling State Budget Cuts

With the state in the midst of an unprecedented budget crisis and the nation gripped by an economic recession, educators know they face an uphill battle. But Siqueiros says the planning has to start today for a successful tomorrow.

"The state must do its part," she says. "Part of it is providing sufficient support and investment in our community colleges and our four-year universities in order to ensure that we do have sufficient seats for students."

At LBCC, Oakley says the college is feeling the pinch of budget constraints, forcing it to cut classes and consider work furloughs.

"As it stands now, [LBCC] is reducing the number of classes that we're offering," he says. "We're making it much more difficult for students to take the classes that they need because of the funding cuts. The budget situation is not going to help us improve our participation in the STEM fields. It's going to require resources to get our students better prepared – unfortunately we're going in the opposite direction.

"The legislature and the governor have made it clear that they expect the community college system to shrink. The state system is reducing its enrollment, and that's unfortunate at this particular time in the state's economy. We should be doing the opposite."

Oakley says although the school hasn't officially announced any furloughs among its 2,400 full- and part-time employees, it is "a real possibility."

Despite the grim economic news, Shulock says she believes the state can battle back and once again become a leader in technology, science, engineering and math fields.

"The glass-half-full view on all this is that California has tremendous resources, tremendous capacity, tremendously diversified economy. . . . It's all here," Shulock adds. "I just think [we need to] recognize the urgency of the problem and then get folks together to collaborate and set priorities. There's certainly no doubt that California can meet this challenge."

The report's recommendations include: • developing a statewide public agenda for higher education focused on setting goals to increase the number of college graduates and prioritizing the workforce needs in high-demand fields like STEM and healthcare; • supporting a student-success agenda to increase the number of students who succeed in transferring from a two-year to a four-year college; • better preparing students in K-12, particularly in math and science; • creating financial incentives for students, colleges and universities to increase the supply of STEM workers; and • improving the coordination between industry and educational institutions

For more information and to view the complete report, visit www.collegecampaign.org/stem.