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Guest columnist

Education is the key to high-tech success

by Edward D. Lazowska
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A new study of "high-tech economic development" or "high-tech workforce" crosses my desk nearly every month. These studies all agree that the Puget Sound region has joined Boston, Silicon Valley and a handful of other regions as a center of the high-tech boom. These studies also agree that there are tremendous workforce gaps in the high-tech economy, both nationally and within our region - gaps that are stifling the growth of high-tech companies.

The Information Technology Association of America predicts that 1.6 million new IT jobs will be created nationally during the coming year, and that more than half of these jobs will go unfilled. The Washington Software Alliance estimates that there are eight jobs in Washington's software industry for every in-state bachelor's graduate with a relevant degree, and four jobs for every in-state community college graduate.

Why should you care? There are at least two reasons.

Unprecedented prosperity

First, the high-tech boom is creating unprecedented prosperity for our region. This prosperity does not yet reach all parts of the state - a challenge that we must face. But even today it extends far beyond Redmond, and far beyond high-tech employees. Each new job in the software industry, for example, is responsible for creating four jobs in other sectors of the economy. And the wealth created by the most successful high-tech entrepreneurs benefits us when we watch the Mariners, catch a show at the Paramount, or enjoy the outdoor recreation made possible through the efforts of environmental organizations. Further, the success of high-tech leaders inspires (and funds) the creation of further new businesses - a "virtuous cycle" that continues to add family-wage jobs to our economy. The potential for the future is almost unimaginable.

Unprecedented opportunity

Second, the high-tech boom is creating unprecedented opportunity for our children. I was lucky - I was lured into computer science by an extraordinary college professor more than three decades ago. Today, the opportunities are tremendously greater. Investing in education will not only create the workforce that today's and tomorrow's high-tech companies require. It will prepare our children to be the next generation of high-tech employees and entrepreneurs - to be the direct beneficiaries of the revolution that is occurring all around us.

Education for a knowledge-based economy

More than anything else, this "new economy" is knowledge-based. What this means is that the "content" of high-tech products is intellectual rather than physical. (Consider software.)

So it's not surprising that the Washington Software Alliance finds that 75 percent of the jobs in Washington's software industry require either a bachelor's or a master's degree. (The Bureau of Labor Statistics cites a similar figure nationally.) Yet, Washington ranks among the *bottom 10 states in the nation* in our capacity to grant bachelor's and master's degrees.

High-tech does employ individuals with a wide range of educational backgrounds, and high-tech indirectly creates employment for an even wider range. The unmet demand for community college graduates is large, particularly in the sectors stimulated by high-tech: system administration, database administration, network administration, technical support, multimedia design, etc.

And, of course, K-12 education provides the foundation for all of this. K-12 must prepare students to continue in technical fields. It's not happening today. According to the White House Office of Science and Technology Policy, in 1997, the U.S. granted 222,000 bachelor's degrees in business, 125,000 in the social sciences, 105,000 in education, but only 25,000 in computer science. The fastest-growing bachelor's specialty in the U.S. - "Parks, Recreation, and Leisure." At the graduate level, the U.S. produced 40,000 lawyers in 1997, but only 857 Ph.D. computer scientists.

The special role of research universities

Research universities have a special role to play. Every major study of high-tech economic development cites the presence of strong research institutions as the No. 1 success factor. (Workforce is No 2; quality of life is No. 3.) Boston has Harvard and MIT; the Research Triangle is named after Duke, UNC, and NC State; Silicon Valley has Berkeley and Stanford; and Seattle has the University of Washington.

Workforce contribution is one reason. UW is the largest supplier in the nation of new college graduates to Microsoft, and also to Intel, as well as being the predominant supplier to many outstanding regional firms. In addition, though, UW brought ARPANET to the Pacific Northwest in 1980, and NSFNET/Internet in 1988, and Internet2 in 1998. The UW Department of Computer Science & Engineering alone has spawned 10 new companies in the past four years, and has licensed many innovations to existing companies, including the first full-text Web search engine (WebCrawler) and the first Web meta-search engine (MetaCrawler).

Yet, our state's support of its research institutions lags. On a per-student basis, UW's state budget is 20 percent below the average of its Olympia-defined peer institutions.

It's time to act

"Houston, we have a problem." Seattle, we do too! *We are denying opportunity to the children of our state.* The time to act is now:

- Invest in our research institutions - the No. 1 factor in high-tech success. The Advanced Technology Initiative launched by Gov. Gary Locke and the Legislature in the last session is a fine example of such an investment, as is the Pacific Northwest GigaPoP, and expansions of top-ranked programs in high-tech fields. Through a combination of these three elements, state support for UW Computer Science & Engineering was increased by 30 percent this biennium.

- Increase bachelor's degree capacity statewide - particularly in regions where we have the opportunity to grow new technology businesses. A prime example is the South Sound region. For example, Tacoma has been heralded as "the most wired city in America." Political leaders - both state and federal - are engaged. Technology businesses are springing up, lured by low cost, high bandwidth, and quality of life. Dramatically ramping up the technology programs at UW-Tacoma makes sense.

- Continue to add technology programs at our community colleges, and to improve articulation between community colleges and 4-year institutions.

- Continue to expand opportunities for distance learning, learning-on-demand, and lifelong learning.

- Build the K-12 pipeline. Parents and students ask me, "What's the best K-12 preparation for a career in computer science?" They're often surprised by my answer: "As much English, math, and science as you can get!" In addition, every student today, in order to be competitive, must be a comfortable and knowledgeable user of information technology. Businesses and higher-ed institutions must launch dramatic new partnerships with K-12.

We have the ability. We must marshal the will.

Ed Lazowska is the Bill & Melinda Gates chair of computer science at the University of Washington. He serves on the boards of directors of the Washington Software Alliance and the Technology Alliance, on the Technical Advisory Board for Microsoft Research, and as a board member or technical advisor to a number of high-tech startups and venture funds.