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Senate

HIGH TECHNOLOGY: MASSACHUSETTS' POT O'GOLD

Mr. TSONGAS. Mr. President, America's prospects for long-term economic growth rest with the knowledge-intensive industries of high technology. The future strength of these industries depends on a well-educated and well-trained work force. Awareness is growing that a commitment to education is not only a commitment to social goals, but an economic necessity.

I would like to share with my colleagues some remarks made by Howard Foley, president of Massachusetts High Technology Council—a distinguished business association. Mr. Foley urges that businesses should increasingly think of support for education as an investment. In his words,

Strategically, logistically, and financially, industry must be a partner—providing assistance—recognizing that an intelligent investment in education is an enlightened investment in its own future expansion, growth and ultimate success.

Mr. Foley's comments articulately emphasize that industry, government, and academia share a common agenda in preparing for the economic challenges of tomorrow.

I ask that Mr. Foley's comments be printed in the RECORD.

The comments follows:

HIGH TECHNOLOGY: MASSACHUSETTS; POT O'GOLD

(By Howard P. Foley, President, Massachusetts High Technology Council, Inc.)

For those of you who might not be familiar with the Massachusetts High Technology Council, we are an association of 125 high technology companies. Most of our members can be characterized as growth-oriented, high-value-added, knowledge-intensive companies that spend proportionately large amounts of money on research and development, and depend primarily on high technology for their products and services. We employ about 115,000 people in Massachusetts, and about 85,000 more throughout the rest of the world. Sales world-wide last year totalled about $11 billion and we invested almost $2 billion in new plant and equipment—up 36 percent from 1980.

We are in business to nurture the profitable growth of the Massachusetts high technology industry. Compared to other industrialized States, Massachusetts has one of the lowest unemployment rates in the country. High tech has not had the severe problems other manufacturing industries have had in this recession, and even though we've slowed down quite a bit, the "help wanted" pages of the Sunday papers are still filled with high tech ads looking for engineers and computer scientists.

However, we are suffering from our own success. The reason so many positions are unfilled is simple—the supply of technical talent has finally been outstripped by industry demand—and unless the high tech industry, government, and educators work together to alleviate this concern, our State, and all those who live and work in the commonwealth, could be in trouble.

Up until very recently, State government and education—as institutions—played minor roles in high tech growth and expansion. Historically, much of the high tech industry in Massachusetts grew out of the space and defense programs, and the baby computer and communications businesses of the fifties and sixties.

During this time, while many of our high tech company presidents were in engineering school, and others were working on aerospace and defense-related projects in both the public and private sectors, they saw unlimited opportunities to commercialize some of their own ideas using high technology. Some talked a few banks into investing seed capital, others talked commitments out of farsighted venture capitalists, and still others simply mortgaged everything they had and began working seven days a week out of their garages. People put their money behind an idea, and then worked like hell to create new markets, satisfy the demands of emerging ones, and make the product turn a profit.

I might add that even without taking a pro-active role, and I want to emphasize the word "pro-active," Massachusetts educators played a big part in high tech development simply by offering a superb education to students who chose to study here—for it is quality education, more so than anything else, that spawns high tech development. High tech companies must have a growing supply of technical talent—engineers, technicans, programmers, and the like. high tech is in the "brains business," and brainpower is to us in Massachusetts what waterpower was to our old textile mills. Without it, high tech grinds to a stop.

For two hundred years, Massachusetts has had an outstanding educational infrastructure—independently supported institutions at first, with publicly supported institutions coming in later on—and the talent pool provided by academia fueled the past twenty years of high technology growth.

However, the present output of engineers, computer scientists, and technicians from our area school is no longer keeping pace with the demand of industry, and as talent shortages grow in other States, recruiting expeditions by out-of-State firms seeking to hire our technical talent away continue to intensify. Many recruiters talk about the high heating bills and severe winters characteristics of New England, but most simply compare personal income tax burdens and cost of living differentials—which are traditionally high in Massachusetts—to sell the so-called "Sun Belt" to Massachusetts engineers and computer scientists. In many cases, the numbers can do all the talking.

To counter this, our State government, academia, and industry must continue to cooperate, collaborate, and commiserate. All three must play a real pro-active role to ensure the continued growth and expansion of the high tech industry. It has become, and will continue to be, the indispensable economic core of our region's industrial and economic development.

This means working to keep the statewide personal tax burden competitive, thereby attracting technical talent from other States, and making it easier for home-grown engineers and computer scientists to stay in the commonwealth. It also means working to expand the capacity of our technical and educational programs, and improving the quality of the programs we already have. Massachusetts has made a lot of progress in the last three years on both fronts, but much more still remains to be done.

We should be able to hold our own with any other State when it comes to the production of degree professionals. Yet, we find today that Texas annually graduates more electronics engineers and computer science majors than we do.

In 1958, Texas graduated 492 and Massachusetts graduated 781. In 1981, Texas graduated about 4,000 and we graduated about 3,000. That's against projected demand, just from our member companies, of about 3,000 a year over the next several years. Worse still, about 25 percent of the Massachusetts graduates will leave the State after they graduate.

Nationally, this country produces, per capita, only half as many engineers as Japan, Further, only 5.8 percent of their bachelors degrees are in engineering, and in West Germany, over 37 percent of their bachelors degrees are in engineering. We're told the U.S.S.R. and the eastern block countries are doing even better.

One recent initiative in Massachusets that combines the expertise and resources of all three groups is the proposed High Technology Park Corporation. Its first project—a $40 million microelectronics center, will train students and working engineers in advanced semiconductor design, test, and fabrication techniques, and will be staffed by university faculty and loaned industry professionals.

The proposed center represents a three-part strategy to strengthen the microelectronic industry in Massachusetts by offering: (1) an up-to-date lab facility for engineering and computer science students and faculty, (2) comprehensive retraining and upgrading programs for industry employees: and (3) a chip-making facility that will give students and teachers a chance to see if their designs really work. The initial $40 million investment will be split by the State and the high technology industry on a 50/50 basis.

Another program that has been supported by industry is a new kind of MBA program at Northeastern University in Boston. Starting in September 1982, Northeastern's School of Business Administration will offer a specialized and accelerated MBA program in high technology. The first of its kind in the country, the degree program consists of twenty-eight courses, including nine traditional MBA courses and sixteen new or redesigned courses, specializing in topics like technological forecasting, R. & D. management, and new product management.

The high technology MBA is aimed at technically-oriented people—engineers, scientists, computer and technical specialists—and high tech managers, and meets at night, allowing professionals to continue to work while attending school.

On our own, the High Tech Council has implemented a number of programs designed to help expand capacity and improve quality in the short term. We have established electronic technician training programs in our community colleges for technical paraprofessionals, stepped up recruiting efforts at out-of-State engineering schools, and worked with the State and community college system to initiate tech writing and computer programing courses for former school teachers who have been laid off due to declining enrollments.

to help, over the long term, we recently developed and formally endorsed a "white paper" on industry/university relations, geared specifically toward expanding engineering and computer science education opportunities over time, and improving existing curricula.

Specifically, there are eight points:

One—view support for higher education as an improvement in human resource development, and not as a charitable contribution.

Two—increase member companies' support for higher education in 1982 to 2 percent of their annual R. & D. expenditures, and then sustain that support on an annual basis for the foreseeable future.

Three—continue to identify and replicate collaborative activities that already work well, and further work to implement others.

Four—anticipate the future by working with universities to develop more relevant curricula and research projects.

Five—recruit more professionally and more actively at regional universities, and sustain recruiting programs in lean years, and not just in growth years.

Six—develop new, and expand current, jointly-sponsored programs in continuing education with universities. In the future, "learn while you earn" will be the norm and not the exception.

Seven—become more visible and more active as supporters of elementary and secondary level education—promote high tech careers, stress the importance of computer literacy, help strengthen math and science curricula, and work to improve teaching methods and techniques.

Eight—continue to encourage the State government to increase its support for higher education, particularly with regard to technical education.

Not surprisingly, the 2 percent of R. & D. support for higher education has attracted the most attention. In fact, many news stories and editorials have adopted it as "the 2 percent solution," and translated it into a minimum investment of $15 million in higher education in Massachusetts—just from our 125 member companies.

We are not, however, serving as a foundation or central money fund. Instead, we act as a facilitator and clearinghouse—bringin individual companies together with colleges and universities, so that they may develop mutually beneficial one-on-one relationships that involve more than just financial assistance and equipment donations.

We help both sides help each other, if we think we need to be involved, but we prefer to let the companies that are donating the time and money has it out directly with the educators.

Many of our members are already involved in university relations programs with local schools, and in order to strengthen the linkage and recognize its importance—one company—analog devices—has taken university programs out of its corporate contributions committee, and established a separate university relations committee—headed by its vice president for strategic planning.

Some of the programs our companies currently participate in include: Career development faculty chairs—whereby a company finances salary and equipment costs for a new or expanding high technology program at a college or university over an extended period of time, improving the quality of life for the professor, and the quality of technical education for the students.

Adjunct professorships—whereby companies "loan" employees to colleges and universitie to teach courses in their chosen fields of expertise once or twice a week. Data General, for example, has two employees teaching at Lowell University on part-time basis.

Curriculum and faculty development and assistance—whereby companies help schools expand or improve technical curricula by providing technical assistance and company training programs. Lowell University, for example, has three professors enrolled in training courses at Data General, while the High Tech Council has just published a guide for universities interested in developing computer science and engineering programs that deals with the skills and knowledge requisite to high tech employment upon graduation. Also, women who have math or science backgrounds, but lack the technical degrees, are presently earning masters degrees in electrical engineering and computer science at Northeastern University in a new "women in engineering" program, facilitated by the High Tech Council, and sponsored jointly with the Bay State Skills Corporation and Northeastern University.

Learn-while-you-earn and continuing education—whereby companies offer part-time consulting contracts to engineering and computer science masters and Ph. D. candidates to encourage them to go on with their education by alleviating some of the financial pain that accompanies this decision—and develop retraining programs with colleges and universities that are used to bring older employees up to speed with new technology.

I don't have the time to go into all the programs we use, but if you wish additional information concerning these, please ask me for it later.

I might add that current Federal tax policy concerning R. & D. tax credits and equipment donation deductions have made corporate investment in higher education virtually painless, and I would not be surprised to see many companies follow the lead of Wang Laboratories of Lowell, Massachusetts, which recently made its first contribution to higher education—A $3 million equipment donation to the Massachusetts University System.

On a more personal note, I wish my colleagues in education would stop talking about the hole in their Federal money bucket, and look instead into industry's money bucket. Many of these tax incentives are designed to fill our money buckets—allowing us to give to colleges and universities without the 20 percent handling charge that Washington normally skims off the top to do this for us.

On State taxes, the High Tech Council has been a vocal supporter of proposition 2½—the property tax limiting referendum question that was overwhelmingly passed by Massachusetts voters in November of 1980. Personal tax rates concern us far more than do business taxes. Our chief resources are our employees, and personal taxes affect our companies far more than do corporate taxes.

Many of the other factors concerning High Tech development—proximity to overseas markets, good airports, decent roads, reasonably efficient and reasonably priced State, county, and local government services, etc., certainly play a role in every High Tech company's ultimate decision, but a strong and responsive educational infrastructure and a reasonable State and local tax burden on our employees and their families mean more than all the rest.

In Massachusetts, the future of the High Tech industry will depend, to a large extent, on the commonwealth's ability to grow and sustain a proficient technical workforce. It should be remembered that this is no longer an issue that can be addressed independently. Instead, all three pieces of the puzzle—industry, academia, and government—must play active roles to overcome the manpower problem.

One essential step for any State interested in developing a strong technology-oriented economic community, but certainly not the only step, would be to encourage initiatives which would result in our graduates at all levels having more computational skills than they do today. Along with this would come a greater familiarity and literacy with analytical tools like the computer making it possible for them to function more successfully in society as it exists today—and as it will continue to evolve into the future.

But educational institutions cannot do this alone: They need help—strategically, logistically and financially, industry must be a partner—providing assistance—recognizing that an intelligent investment in education is an enlightened investment in its own future expansion, growth, and ultimate success.

In the long run, this investment will help everyone—for to be technologically rich is even more valuable than to be oil rich—because technological creativity is inexhaustible, if we are smart enough to invest in it today.

I want to thank you for this opportunity to speak before you today, and I would be pleased to answer any questions you may have concerning my remarks.