

## Economic Commentary

by W. Michael Cox

Vice President and Economic Advisor  
Federal Reserve Bank of Dallas

# Education and the Reindustrialization of the Texas Economy

Unlike much of the rest of the nation, Texas is historically an earth-derivative economy. Our well-being has been derived largely from the ground: from oil, from agriculture, from cattle, and from the sale of the land itself. Now suppose that we took the state of Texas and dried up all the oil, removed permanently all of the cattle, destroyed most of the crops, and reduced the amount of inhabitable land by 90 percent. Then suppose we built a large fence or dug a deep moat around the state, so that no one could leave (at least not easily). The first question is, "What would we have?" The answer is ... *Japan*.

Japan is an economy with no cattle, virtually no agriculture, relatively little usable land, and with all its oil imported; yet, it is one of the most successful economies in the world today. The second question is, "How do the Japanese do it?" The answer is ... *education*.

The reality of just how valuable education is in today's world economy has never been made more clear to me than it was a couple of months ago while talking with a young economist from Japan. I asked him, "What makes Japan so successful?" His reply (in English) was, "In Japan, you need education." Our immediate response is probably to agree. But as to exactly how education has enabled Japan to be better off—to have one of the fastest growing economies and largest trade surpluses in the world today—we may be less sure. So the first point that I want to make is that *education is embodied in products*.

Education is contained in products ... and in different amounts. Although, to my knowledge, no measure exists of the amount of education embodied in different types of products, I think we can all clearly see that different products embody education in different amounts. Consider, for example, the average amount of human knowledge, education, information, and research—or whatever you'd like to call it—that is implicitly contained in the anti-ulcer drug cimetidine as compared to mashed potatoes; in microcomputers as compared to hand-crank adding machines; in nuclear power plants as compared to coal-burning facilities; or in microwave ovens as compared to conventional ones. Education is embodied in different products in different amounts.

So when my friend told me, "In Japan, you need education," he was really telling me that Japan is producing goods which largely embody education. Call them high-tech products, or whatever, but Japanese goods are relatively intensive in knowledge and education and relatively scarce in other factors, such as natural resources or even labor. Japan no longer has cheap labor, so this is not the resource that the

Japanese are now selling. They are selling education. Indeed, now that Japan has made the transition from selling goods which embody cheap labor to those which embody education, their labor is no longer cheap. (In other words, their wages and standard of living are higher.) And that is an important comparison because the wage difference measures the payoff to education.

Japan's experience clearly helps us understand the importance of education in today's world economy. Instead of swinging a hoe, we are now splicing genes to develop a new strain of corn capable of growing in near-desert climates; instead of assembling an automobile, we are now creating design software to produce a robot which will assemble the auto; and instead of building dams to harness the power of falling water or extracting oil from the ground to burn in power plants, we may be soon generating power via nuclear fusion in cold water—power which would flow through superconductive materials.

The world is in a period of unprecedented technological progress. But unlike previous periods of technological change, science and education are having a *direct* effect on technological change this time (as compared to their effect in the past which was largely oblique). This is clearly the message of technological advances in such areas as biochemical and biogenetic engineering, supercomputers, microprocessors, computer software, aerospace, medical technology, food technology, robotics, ceramics, semiconductors, fiber optics, composites, telecommunications, consumer electronics, and even, arguably, factory automation.

In short, today's technological revolution is education-led. And because of this, education has become much more valuable for the average person. Clearly, education has also become more critical for the future of the Texas economy. More and more these days, centers of prosperity are centers *not* of natural resources or simply providence but of knowledge and education. Education is a country's "ticket out"—permanently out—of a depressed and underdeveloped economic condition. Education is also Texas' ticket out. In crafting the much-needed reindustrialization of our economy, primary focus should be placed on developing an economic base supported by and centrally linked to education.

The bottom line is that Texas needs to invest more in education. Do we want to be a state that stays on the leading edge of technology, thereby commanding the higher-paying jobs and maintaining the higher standard of living? If so, then education is the answer.