

For release on delivery
7:00 p.m. EST
October 29, 2002

Remarks by
Alan Greenspan
Chairman
Board of Governors of the Federal Reserve System
before the
Institute of International Education
New York, New York
October 29, 2002

It is an honor to be here this evening to accept the Stephen P. Duggan Award for International Understanding. After a year during which violence and terror have so engaged our public discussions both here and abroad, I appreciate this opportunity to share with you some more civilizing and constructive thoughts. I plan to address the important role that education has played in raising standards of living, especially in the United States, and in contributing to positive social and economic relationships across the globe.

Although I will focus on institutions of formal education, we need to be reminded that people have been educating themselves one way or the other since the dawn of history. Our faculty for rational thought has carried us one arduous step at a time into a deeper understanding of how the world works. Decade by decade, scholars have recorded their insights, building knowledge from one generation to the next. Although wars, international conflicts, and economic crises have interrupted our progress from time to time, we have, nonetheless, persisted in learning to use our hard-won knowledge to alter our physical and social environment for the better. Especially notable has been our application of both scientific advances and organizational paradigms to raise living standards across most of the population, and, as a consequence, engender marked increases in average longevity and quality of life.

Over the last century, for example, real gross domestic product in the United States has grown at an average of more than 3 percent per year. Only a small fraction of that increased value represents a rise in the tonnage of physical materials--oil, coal, ores, wood, and raw chemicals, for example. The remainder represents new insights into how to rearrange those physical materials to better serve human needs.

This process has enabled valued goods to be transported more easily and to be produced with ever fewer workers, allowing a more efficient division of labor to propel overall output and standards of living progressively higher.

The share of the nation's output that is conceptual appears to have accelerated after World War II with the insights that led to the development of the transistor and microprocessor. They have spawned remarkable alterations in how we, and many other societies, live.

Computers, telecommunications, and satellite technologies have enabled data and ideas--the ever more important elements of valued output--to be expeditiously transferred geographically to where they can be put to best use. Thus, these advanced means of communication have added much the same type of value that the railroads added in transporting the more-physical goods of an earlier century.

Here in the United States, we have developed an exceptionally sophisticated stock of capital assets--fostered by the most conceptual and intangible of all new products--software. Breakthroughs in all areas of technology--despite the recent slowdown--have been continually adding to the growing list of almost wholly conceptual elements in our economic output. These developments are affecting how we produce output and are demanding greater specialized knowledge.

In broad terms, the available empirical economic research has identified a complex of factors as key determinants of how successful any country will be in transforming its physical and human assets into economic growth: openness to trade, a strong institutional infrastructure, disciplined macroeconomic policies, and an effective system of education--formal or otherwise. Although the relative contribution of any single factor remains under debate, most observers

would agree that the success of these factors in accounting for relative rates of economic growth across countries lies importantly in the interactions of the determinants themselves. An educated workforce, then, is a necessary ingredient for economic advance, but it is apparently much more powerful when combined with a strong, competitive economic system, where rights of persons and property are protected.

In that regard, an economist can scarcely fail to notice the advantages that we have accrued in this country by having the marketplace work efficiently to guide our educational system, defined in its widest sense, toward the broader needs of our economy.

The history of education in the United States traces a path heavily influenced by the need for a workforce with the skills required to interact productively with the evolving economic structure. Over the generations, technological advance has brought with it not only improvements in the capital inputs used in production but also new demands on workers who must interact with that increasingly more complex stock of capital. Early last century, these advances required workers with a higher level of cognitive skills--for instance the ability to read manuals, to interpret blueprints, or to understand formulas.

Our educational system responded: In the 1920s and 1930s, high school enrollment in this country expanded rapidly, pulling youth from rural areas, where opportunities were limited, into more productive occupations in business and broadening the skills of students to meet the needs of an advancing manufacturing sector. It became the job of these institutions to prepare students for work life, not just for a transition to college. In the context of the demands of the economy at that time, a high school diploma represented the training needed to be successful in

most aspects of American enterprise. The economic returns for having a high school diploma rose and, as a result, high school enrollment rates climbed.

By the time that the United States entered World War II, the median eighteen year-old was a high school graduate--an accomplishment that set us apart from other countries. I should note that I regret that, more recently, international comparisons have not been so favorable; tests of student achievement in mathematics and science suggest that our high schoolers have been falling short of their peers in other countries. I trust that this degradation will prove to be transitory.

As was the case with our high schools, the evolution of our system of higher education was also influenced importantly by the need to respond to advances in economic processes. Although many states had established land grant schools earlier, their support strengthened in the late nineteenth century as those whose economies specialized in agriculture and mining sought to take advantage of new scientific methods of production.

Early in the twentieth century, the content of education at an American college had evolved from a classically based curriculum to one combining the sciences, empirical studies, and modern liberal arts. Universities responded to the need for the application of science--particularly chemistry and physics--to the manufacture of steel, rubber, chemicals, drugs, petroleum, and other goods requiring the newer production technologies. Communities looked to their institutions of higher learning for leadership in scientific knowledge and for training of professionals such as teachers and engineers. The scale and scope of higher education in America was being shaped by the recognition that research--the creation of knowledge--complemented teaching and training--the diffusion of knowledge. In broad terms,

the basic structure of higher education remains much the same today, and it has been one that has proven sufficiently flexible to respond to the needs of a changing economy.

Market economies have succeeded over the centuries by granting rewards to those who could anticipate changes in the value preferences of society. America's system of higher education has evolved into a highly diverse and complex range of institutions--large research universities that combine undergraduate and graduate offerings, small liberal arts colleges, and vocation-oriented community colleges--all seeking their competitive advantage. What makes that system work effectively is that it has been influenced importantly by the values of a strong market economy--competition, risk-taking, and innovation.

America's reputation as a world leader in higher education is grounded in the ability of these versatile institutions, taken together, to serve the practical needs of an economy and, more important, to unleash the creative thinking that moves a society forward. It is the recognition of these values that has attracted such a large segment of the world student population to our institutions of higher learning.

In a global environment in which prospects for economic growth now depend importantly on a country's capacity to develop and apply new technologies, the research facilities of our universities are world class. The payoffs--in terms of the flow of expertise, new products, and start-up companies, for example--have been impressive. With the emergence of significant centers of commercial innovation and entrepreneurship--Silicon Valley, the Research Triangle, and the clustering of biotech enterprises in the Northeast corridor--creative ideas flow freely between local academic scholars and those in industry. Those ventures that succeeded have

materially added to our base of knowledge. But even those that failed, as many did, left residual insights that may spark future research.

Beyond these highly visible achievements, what has made our research universities so extraordinarily productive is their promotion of peer-reviewed scholarship and the value they place on creativity and risk-taking. Although some innovations move quickly from the development stage to applications, we usually cannot accurately predict which particular scientific advance, or synergy of advances, will ultimately prove valuable.

One has only to recall our experience with the laser, which had to wait for improvements in fiber optics to yield important applications. Indeed, according to Nobel Laureate Charles Townes, in the late 1960s the attorneys for Bell Labs initially refused to patent the laser because they believed it had no applications in the field of telecommunications. Our universities have shown the patience and the flexibility to accept that uncertainty, confident that the rigorous effort to explore ideas would eventually lead to discovery.

What our colleges and universities produce is obviously highly valued in today's economy. The rise in that value over the past several decades has been reflected in a widening spread between compensation paid to college-educated workers relative to those with less schooling. This increased investment in college-trained human capital has resulted in a flow of labor input into the economy that has made an important ongoing contribution to U.S. economic growth.

Early in the twentieth century, high school education was challenged to meet the needs of an evolving economy; in the twenty-first century, our institutions of higher learning will bear the enormous responsibility of ensuring that our society is prepared for the demands of rapid

economic change. We must ensure that teaching and research continue to supply the creative intellectual energy that drives our system forward. As the conceptual inputs to the value added in our economic processes continue to grow, the ability to think abstractly will be increasingly important across a broad range of professions. Critical awareness and the abilities to hypothesize, to interpret, and to communicate are essential elements of successful innovation in a conceptual-based economy.

The roots and nature of how the human mind innovates have always been subject to controversy. Yet, even without hard indisputable evidence, a remarkable and broad presumption is that the ability to think conceptually is fostered through exposure to philosophy, literature, music, art, and languages. So-called liberal education is presumed to spawn a greater understanding of all aspects of living--an essential ingredient to broaden one's world view. As the President of the University of Pennsylvania, Judith Rodin, put it, such an understanding comes by "vaulting over disciplinary walls" and exploring other fields of study. Most great conceptual advances are interdisciplinary and involve synergies of different specialities.

Yet the liberal arts embody more than a means of increasing technical intellectual efficiency. They encourage the appreciation of life experiences that reach beyond material well-being and, indeed, are comparable and mutually reinforcing. The intense pleasure many experience from listening to Mozart's great D Minor Piano Concerto has much in common with the deep satisfaction of solving a complex mathematical problem. The challenge for our institutions of higher education is to successfully blend the exposure to all aspects of human intellectual activity, especially our artistic propensities and our technical skills.

The challenge is particularly daunting because scientific knowledge expands and broadens the measurable rewards of its curriculum at a pace that liberal arts, by their nature, have difficulty matching. The depth of knowledge in nuclear physics is today far greater than it was a century ago, and useful teaching hours have doubtless expanded many fold. But do the same possibilities exist for courses in English literature?

Similar differences between science and the arts arise in the nonacademic world: Engineering and metallurgical insights have reduced the number of people required to produce a ton of steel, but the same number of musicians will be needed to perform a Beethoven quartet this evening as were needed a century ago. Many of you will recognize this application of Baumol's law. To make the point even more graphically, Daniel Patrick Moynihan has noted that the Minute Waltz could be played in fifty seconds, but he wondered whether it would sound as good.

Overwhelmed with the increasing scientific knowledge base, our universities are going to have to struggle to prevent the liberal arts curricula from being swamped by technology and science. This institute, by encouraging Americans to seek wider educational experiences abroad, is doing its part to prevent that from happening.

The advent of the twenty-first century will certainly bring new challenges for our society and for our education system. We cannot know the precise directions in which advances in technology, conceptual thinking, and the transmission of knowledge will take us. However, we can be certain that our institutions of higher education will remain at the center of the endeavor to comprehend those profound changes and to seize the opportunities to direct them toward ever-rising standards of living and quality of life.

A global society reflects an ever more open economic environment in which participants are free to engage in commerce, finance, and education wherever in the world the possibilities of increased value added arise. The breaking down of barriers to commerce fosters ever greater cross-border contact and further exploitation of the values of specialization, but on a global scale.

Fear of terrorist acts, however, has the potential to induce disengagement from activities, both domestic and cross-border. If we allow terrorism to undermine our freedom of action, we could reverse at least part of the palpable gains to the United States and our trading partners achieved by postwar economic integration. It is incumbent upon us not to allow that to happen.

In that regard, I was pleased to hear that the recent survey that your organization conducted among international education professionals showed no diminution of enthusiasm for study abroad by U.S. students and for study in the United States by international students. As your President, Allan Goodman, remarked, this is a time for more international exchange, not less, and a time for open, not closed, minds.