Powerful economic, technical, and social trends—facilitated by the Internet—are revolutionizing all traditional concepts of economics, business, education, and learning. The effects on higher education are especially profound. James Brian Quinn, emeritus professor of management at the Tuck School of Business at Dartmouth College, believes that the word “education”—in the formalistic, programmatic fashion we usually think about it—may be obsolete.
New Economic Drivers: Frequent Revolutions

Many concepts and standards related to scientific phenomena, technology, economic activity, enterprise management, social interactions, and personal development are not just evolving quickly, but are undergoing repeated and frequent revolutions at all levels. One can assess the many and varied implications for higher education of change of this scope by considering the most important economic trends affecting colleges and universities today. These include:

The shift from a materials to a services and knowledge based economy. Today, over 80 percent of American employment is in the services industries, and another 12 percent of total employment is in services activities within product-based companies. Services are generally defined as “intangibles sold in trade,” such as healthcare, financial services, entertainment, education, software, telecommunications, retailing, and so on. Service industries have provided essentially all the nation’s job growth since the 1960s, and the highest paying jobs are in this sector. Despite this, the services are still derided in popular rhetoric as “hamburger flipping,” or “taking in each other’s laundry.” This attitude prevails in academia as well, to the detriment of curricula content, pedagogical methods, and learning.

The preeminence of intellect, innovation, technology, and software—not capital or products—as economic drivers. The primary beneficiaries of software and services technologies are customers rather than those companies creating the actual innovation. Sun Microsystems, for example, estimates that its customers make 20 times more money on its products than the company does itself. Because of interactivity effects, these technological multipliers will be extraordinarily large for Internet use. Yet the myth that wealth depends on material goods is still reflected in economic and educational policies, largely due to the failure to effectively measure the value of services in the national and global economies.

The disaggregation and globalization of technology and economic activity in all fields. As the service sector has grown in scale, individual specialized service firms have become large and sophisticated relative to the scale and expertise individual staff and service groups have within integrated companies. Independent service providers can offer greater knowledge depth, invest more in software and training systems, and be more efficient. Therefore, they can offer higher wages to attract top people than can the individual staff groups of all but a few integrated companies. To realize maximum benefits, companies have moved steadily toward core-competency-with-outsourcing strategies. In fact, profitability in many industries correlates highly with the degree of outsourcing undertaken.

The knowledge economy’s structures already are disaggregating into “puddles” of highly specialized knowledge interconnected by invisible communication and network and alliance agreements. Each puddle, or knowledge center, develops its own skills in depth around its core competencies and broadcasts its needs and capabilities to the others—combining with them to solve specific problems as required (see Figure 1).

The keys to success in these systems are T-shaped skills—best in world knowledge depth in one’s selected competencies, accompanied by a capacity to appreciate, understand, and relate to other fields. This is distinctly not a strength of universities’ past rigid adherence to

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The explosion of knowledge generation, innovation, and technological progress rates. In the past, great spurts of knowledge and advance have occurred whenever a totally new database, problem, technology, or concept made it possible to intersect previously unassociated matrices of thought or to verify results in a new way. Galileo’s telescope, for example, opened myriad new hypotheses and confirmatory possibilities in astronomy. In the Internet and software-based innovation world, such phenomena occur continuously, with new databases, combinations, and tests interacting quickly to open whole new intellectual pastures.

Extensive network-facilitated interactions across knowledge centers provide potential for extraordinary amplification of innovation and technological progress at much lower costs worldwide. Well-designed software acting over the Internet can compress and facilitate all aspects of the innovation cycle. It can lower cycle times, investment costs, and risks by factors of 60 to 90 percent, while increasing output values by orders of magnitude. The rates of scientific, technical, and user needs advances in most fields are so great that no single enterprise—acting alone—can hope to keep up. Complexity has become so high that single enterprises can rarely achieve major innovations. This has vastly expanded the outsourcing of innovation—formerly a strategic heresy—which has led to further radically new concepts of organization, innovation management, and industrial structures worldwide.

Implications for Higher Education

The role of the university in the knowledge-based services society is, must, and will be changing rapidly. Because of Internet capabilities, the university’s traditional role as the leading 1) research source and knowledge creator, 2) archivist and gateway to knowledge, 3) disseminator of advanced knowledge, and 4) referee and evaluator of truth has already been overturned. Today, universities perform just 2.2 percent of all U.S. research and development.

College and university leaders need to recognize the structure of the knowledge-based economy. They should consider how higher education institutions might best fill their roles as specialized knowledge centers, outsourcing their needs and collaborating with others to push the frontiers of knowledge.

In terms of contributing to the broad understanding of the new economy, independent university research should focus on correcting the vague definitions and limitations of current economic measurement systems. These limitations grossly underestimate the output, value, and effects of the services economy. Few execu-
tives and analysts fully understand the limitations of these data, which are used to guide strategic decisions and policy making.

College and university leaders must also address newly emerging legal and ethical problems generated by the Internet and new technologies. High priorities are the need for new educational, economic, and social control concepts, as well as the issues of wealth distribution, public versus private wealth, and environmental-economics trade-offs and improvement. With enough emphasis and new and better data from the Internet, more complete theories integrating these elements will emerge.

Given the rapid and constantly interacting nature of today’s knowledge systems, educational strategies that try to target specific opportunities, define skills needed, and train for them will rarely work effectively. The “planned for” skills are obsolete before the educational start-up and training cycle gets its product to market. Generally, students can get the factual learning they need from electronic sources. Universities need to hone students’ capacities to analyze, interrelate, and communicate about these facts. The university has gone from the center to an access node on the knowledge network.

The new Glassmeyer-McNamee Center for Digital Strategy at Dartmouth’s Tuck School reflects the sort of structural changes we can expect more of in the future. Through advanced communications technologies, the Center brings together students, academic thought leaders, and industry users who engage in the process of direct discovery, interrelating elements of multiple disciplines around real problems and opportunities generated by alumni and industry contacts. Philip Anderson, director of the Center, notes that the Center’s model “is not ‘training,’ where the trainer has knowledge to impart to students, but rather ‘consulting,’ where bright minds with different perspectives gather data, problems, and solutions from a wide variety of sources and then creatively combine them to define or solve problems.”

Conclusion

The only true conclusion one can draw about the effect of the Internet on higher education is that it will revolutionize traditional concepts. Learning is shifting from a content to a communication and process mode; in the knowledge economy, “ignorance” is presumed at the outset of a problem, with the “need to learn” as essential to reaching a solution. In short, the most productive educational strategy of the future is likely to be active engagement with the growing, moving cutting-edge of knowledge.

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