Technology: Reshaping Economy and Educational Goals

The emergence of ubiquitous Internet connectivity and broadly accessible personal computing over the last decade has created the prospect of a revolution in higher education. Many have claimed that these technological changes, which have already disrupted business models in many industries, will dramatically alter both business models and pedagogical models in higher education. According to this view, the combination of Internet connectivity and personal computers renders obsolete the traditional lecture model of educational delivery, with its expensive personnel and physical plant costs.

In place of classroom lectures, standardized courses of instruction—drawing on the talents of world-renowned instructors—will be delivered on the Internet. These efforts will be delivered at heretofore unimaginable scale and, consequently, at a significantly reduced cost per student. In this approach, mass distribution of educational content will produce increases in educational productivity just as mass production and mass distribution have increased productivity in many other industries. The centuries-old model of instruction will finally evolve, heralding a new era of increased global access to low-cost higher education.

Although there have indeed been dramatic increases in the number of students participating in online education, this vision has been clouded by significant challenges. Many examinations of contemporary practices have demonstrated that mass instruction using Internet technologies is associated with very low course-completion rates. Further, students who face academic and financial challenges—a key target group for expanded access—fare poorly in learning environments that emphasize delivery through technology rather than face-to-face interactions. Moreover, and to the chagrin of both college/university presidents and chief technology officers, the per-student costs of online education have sometimes far exceeded optimistic estimates. (I must admit to having learned the hard lesson that there is no such thing as a one-time technology cost.)

The question of how developments in information technology can change pedagogy in higher education is an important one, but a single-minded focus on this issue is diverting attention from an even more fundamental set of questions. How are ubiquitous Internet connectivity and widespread access to personal computing dramatically changing the economic structure of our society and, consequently, the educational preparation necessary for graduates to thrive? What are the critical implications not only for how students are taught but also for how broader educational goals and purposes are met?

At a general level, the relationships between a society’s technological advances and its educational goals and purposes are obvious—especially when seen through the lens of history. The shift from the curricula of American colonial colleges, focused on instruction in Greek and Hebrew, to the curricula of U.S. land-grant universities, focused on agricultural production and other mechanical technologies, clearly reflected the nation’s developing industrial technologies. The relationships between the development of specific technologies and specific academic degree programs are also evident—again, particularly with retrospective analysis—as aerospace engineering degrees emerged with manned flight and as molecular biology degrees followed a string of technical discoveries in genetics and biochemistry.

Clearly, this has also happened with contemporary developments in information technology, as undergraduate and graduate degree programs have grown dramatically in the fields of computer science, computer engineering, and information systems. However, the emergence of personal computing and the widely accessible Internet has educational implications that go far beyond the development of individual degree programs. These technologies are changing the relative importance of various cognitive abilities and processes—often referred to, in discussions of general education, as “habits of mind”—for economic success. I envision this shift will, over time, change the broad educational goals and purposes of higher education institutions.

An analogy to the development of the technologies of radio, television, and film may help clarify this process. These technologies allowed for the mass distribution of entertainment, and the mass marketing associated with these new media significantly increased the impact of marketing on our daily lives. This increase, in turn, amplified the importance of cognitive abilities related to marketing because of their growing influence on economic success in society. Specifically, the ability to persuade through marketing is now an essential skill in many professional fields, as is the ability to critically evaluate marketing messages.
Higher education institutions have responded to this change in the relative importance of marketing by increasing the role of communication and critical thinking in general education requirements and by developing specific degree programs in communications, public relations, marketing, and critical studies.

Yet the emergence of the omnipresent Internet and broadly accessible personal computing has still more fundamental implications. These technologies are dramatically democratizing the ability to produce economic products by providing instantaneous access to resources from around the globe. Everything from news and history to visual images, calculators, and expert analyses is readily available with the click of a button. Similarly, the computing power inherent in a watch or hand-held device can provide highly sophisticated real-time analyses of stock markets, weather forecasts, navigation guidance, and even medical diagnoses. The development of 3D printing, computer-aided design, and systems for the recognition and production of speech and visual images has dramatically enhanced the possibilities for decentralized production. Moreover, these resources are generally available at exceptionally low costs, removing the traditional cost barrier to production. Thus, a person in the average office cubicle (or lying at home on his/her couch) now has access to extraordinary resources for creating, producing, and distributing products, algorithms, services, and ideas without large up-front investments.

These developments create the possibility of an era in which small groups with relatively limited resources can become centers of innovation, production, and distribution. In a dramatic departure from the future envisioned by Marx and Engels, the tie between investment capital and the mechanisms of production has been weakened. We have already seen the disruption of the communications industry (i.e., advertising, public relations, and journalism), changes in the services industry with Uber and Lyft in transportation and Airbnb and FlipKey in lodging, and inroads in manufacturing as small companies use new technologies to make everything from auto parts to prosthetics. In this new environment, the ability to innovate and produce things—that is, the ability to design, create, and test—is at a premium, and educational programs must help students develop these abilities.

This framework raises a number of important challenges for those of us who are higher education administrators and technology officers. We must reframe our discussions of technology to go beyond questions regarding methods of education delivery to the more complex issue of how the societal changes associated with technology should alter our educational goals and programs. These discussions require that we generate and evaluate hypotheses about the effects of technology on society and consider the complex question of how to alter our educational goals to prepare students for this new world. For administrators and technology officers, this will mean discussing our curriculum and our co-curricular programs—topics generally viewed as the province of faculty members and student affairs professionals. Collectively, we must articulate the abilities and characteristics required by the societal changes, as well as the best ways to impart these to our students.

Given the breadth of such issues, different institutions will likely pursue them in different ways. At San Diego State University, two themes have already emerged that may be instructive. First, we are examining whether the evolving notion of design thinking is an ability that will help our students thrive in this new environment. Broadly defined, design thinking focuses on identifying important problems or challenges, bringing collaborators together to create solutions, simulating or rapidly prototyping the solutions, and iteratively testing and refining potential solutions. This constellation of abilities is about finding solutions to difficult problems; consequently, we believe that developing these abilities will strengthen our students’ capacities to innovate and produce.

Second, our initial efforts have been focused on co-curricular programs. Specifically, we are incorporating design thinking into our entrepreneurship programs at the Zahn Innovation Platform and the Lavin Entrepreneurship Center, whose programs center on creating for-profit and social enterprises. We have focused on co-curricular programs because, in contrast to curricular programs, their administrative structures permit rapid changes that allow flexible development of new approaches. And we are concentrating on our entrepreneurship programs because the abilities to identify problems and to collaborate in finding and prototyping solutions are often essential to the creation of a new enterprise.

The era of distributed production is here, and students will need new skills and abilities to thrive in it. The discussions regarding how higher education should adapt to this new era are just beginning. The steps mentioned above are, admittedly, small ones. I look forward to a broader conversation with members of the academic community—a conversation in which technology leaders will play a critical role.

Notes

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