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**The Upshot**

# What to Learn in College to Stay One Step Ahead of Computers

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Economic View

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Computers and robots are already replacing many workers. What can young people learn now that won't be superseded within their lifetimes by these devices and that will secure them good jobs and solid income over the next 20, 30 or 50 years? In the universities, we are struggling to answer that question.

Most people complete the majority of their formal education by their early 20s and expect to draw on it for the better part of a century. But a computer can learn in seconds most of the factual information that people get in high school and college, and there will be a great many generations of new computers and robots, improving at an exponential rate, before one long human lifetime has passed.

Two strains of thought seem to dominate the effort to deal with this problem. The first is that we teachers should define and provide to our students a certain kind of general, flexible, insight-bearing human learning that, we hope, cannot be replaced by computers. The second is that we need to make education more business-oriented, teaching about the real world and

enabling a creative entrepreneurial process that, presumably, computers cannot duplicate. These two ideas are not necessarily in conflict.

Some scholars are trying to discern what kinds of learning have survived technological replacement better than others. Richard J. Murnane and Frank Levy in their book “The New Division of Labor” (Princeton, 2004) studied occupations that expanded during the information revolution of the recent past. They included jobs like service manager at an auto dealership, as opposed to jobs that have declined, like telephone operator.

The successful occupations, by this measure, shared certain characteristics: People who practiced them needed complex communication skills and expert knowledge. Such skills included an ability to convey “not just information but a particular interpretation of information.” They said that expert knowledge was broad, deep and practical, allowing the solution of “uncharted problems.”

These attributes may not be as beneficial in the future. But the study certainly suggests that a college education needs to be broad and general, and not defined primarily by the traditional structure of separate departments staffed by professors who want, most of all, to be at the forefront of their own narrow disciplines. But this old departmental structure is still fundamental at universities, and it is hard to change.

Consider the controversy at Harvard College over the **Program in General Education**, whose antecedents date to 1946. The program requires Harvard undergraduates to take courses devised to prepare them for a broad range of issues in life after college. But critics have said that the program is not succeeding, and that many professors who participate in it teach only their own department’s scholarly material, without attention to wider aims.

Prof. Louis Menand of Harvard, in a May 5 statement, argued that an education focused on narrow academic disciplines was inadequate: “Less than 20 percent of our students go on to get Ph.D.s,” he said. Many students end up in the business world, broadly construed, not in academia.

In a separate May 5 statement, Prof. Sean D. Kelly, chairman of the General Education Review Committee, said a Harvard education should give

students “an art of living in the world.”

But how should professors do this? Perhaps we should prepare students for entrepreneurial opportunities suggested by our own disciplines. Even departments entirely divorced from business could do this by suggesting enterprises, nonprofits and activities in which students can later use their specialized knowledge.

Many of these issues have arisen in my own academic life. My teaching has changed over the decades. I try to make it more useful in confronting issues of creativity and morality in the work world.

When I arrived at Yale in 1982, there were no undergraduate courses in finance. I started one in the fall of 1985, and it continues today. Increasingly, I’ve tried to connect mathematical theory to actual applications in finance.

Since its beginnings, the course has gradually become more robotic: It resembles a real, dynamic, teaching experience, but in execution, much of it is prerecorded, and exercises and examinations are computerized. Students can take it without need of my physical presence. Yale made my course available to the broader public on free online sites: AllLearn in 2002, Open Yale in 2008 and 2011, and now on Coursera.

The process of tweaking and improving the course to fit better in a digital framework has given me time to reflect about what I am doing for my students. I could just retire now and let them watch my lectures and use the rest of the digitized material. But I find myself thinking that I should be doing something more for them.

So I continue to update the course, thinking about how I can integrate its lessons into an “art of living in the world.” I have tried to enhance my students’ sense that finance should be the art of financing important human activities, of getting people (and robots someday) working together to accomplish things that we really want done.

Like Harvard and other colleges and universities, Yale has been struggling with the broad issues for a very long time. It once experimented with an undergraduate business program, to prepare students for life beyond college, but shut down that program in 1954. In the 1960s, during the Vietnam War,

antipathy to the business establishment increased. According to the former Yale Graduate School dean John Perry Miller, in his book “Creating Academic Settings” (J. Simeon Press, 1991), there was open “hostility” to the idea of business-oriented education at Yale.

Nonetheless, Yale produced many fine businesspeople. But because of this hostility, Yale did not start a business school until 1976, and even then denied that it was *just* a business school: Instead of offering a Master of Business Administration, it initially conferred only the more idealistic-sounding Master of Public and Private Management. Before 1976, the university had a great economics department, imbued with a lofty sense of pure theory and mathematics, but it was not focused on practical business education.

The developing redefinition of higher education should provide benefits that will continue for decades into the future. We will have to adapt as information technology advances. At the same time, we must continually re-evaluate what is inherently different between human and computer learning, and what is practical and useful to students for the long haul. And we will have to face the reality that the “art of living in the world” requires at least some elements of a business education.

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