Educating the Future
Or
How I Learned to Stop Worrying
And Love Graduate School

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I have to say that this topic is pretty intimidating. Lots of people a lot smarter than me have talked about the future and made some pretty stunning bloopers.

For example, Robert Millikan was an atomic physicist who won the Nobel Prize in 1923 for measuring the mass of the electron. I have the distinction of graduating from the same high school as Dr. Millikan in a little town called Maquoketa, Iowa. He was a smart man indeed, so smart that he predicted in his Nobel address that "There is no likelihood man can ever tap the power of the atom." Albert Einstein felt the same way. It was actually a non-physicist, H.G. Wells, who inspired the breakthrough that eventually led to splitting the atom. So scientists can be wrong.

Scientists don't have a monopoly on error. Ken Olsen was a brilliant entrepreneur who founded Digital Equipment Corporation. His engineers designed the core of what was to eventually become Windows NT. But in 1977 he said "There is no reason anyone would want a computer in their home." Similarly, when Steve Wozniak and Steve Jobs tried to market the original idea for a personal computer to Hewlett Packard and to Atari, no one was interested. In 1943 Thomas Watson, Chairman and CEO of IBM, predicted that the world-wide demand for computers would never exceed five. That's five computers. Worldwide. Ever. And he was in charge of IBM. So businessmen can be wrong.

When Fred Astaire first auditioned in Hollywood a Paramount executive reported: "Can't act. Can't sing. Balding. Can dance a little." So artists and talent scouts can be wrong.

The Supreme Commander of Allied Armies in World War I, Marshal Ferdinand Foch, was regarded as having the most original and subtle mind in the French Army in the twentieth century. Yet Marshal Foch said "Airplanes are interesting toys but of no military value." So generals can be wrong.

I would give you examples of politicians being wrong but our time is limited.

The point is that predictions of the future are probably wrong. They are especially probably wrong if someone is saying something can**not** be done. Some futurists seem to get it right more often than others – H.G. Wells and Robert Heinlein were two science fiction visionaries who made predictions that, in retrospect, are stunning. But they had their bloopers that we

conveniently overlook – Heinlein's quaint vision of giant conveyor belts linking cities together comes to mind for example. So futurists can be wrong.

So if I'm supposed to talk about educating the future, the first prediction I'll make is that much – perhaps most – of what I have to say will turn out to be wrong. That's one prediction in which you can have high confidence.

In looking forward to the future, there are two basic principals that seem useful to apply. First, the future will look a lot like the past. Second, the future will look really different from the past.

It is paradoxical that these contradictory principals are both at least partly true. The future is created in the past. The scientific, social and technological narratives of the present are derived from the past and direct the future. However, those narratives interact and evolve in surprising and fundamentally unpredictable ways. It is this connection to our shared heritage that makes the future look like the past. It is the evolution of that heritage and the interconnections that make the future so very different from the past.

Automobiles are an example of this evolution and interaction. At the outset, we called automobiles "horseless carriages." As IT guru Nicholas Negroponte has observed, this tells us a lot about how the automobile pioneers regarded the new contraption. They saw it as an extension of what had gone before. But there were other social changes just waiting to happen and these were facilitated and accelerated by the automobile. Automobiles were liberating, enhancing social mobility and even relaxing sexual mores. It is no coincidence that the sexual liberation of the 1920's coincided with broad introduction of the automobile. Rural populations shrunk and cities grew, enabled by the automobile. The invention of the assembly line led to large scale manufacturing which in turn led to political and economic movements which were all connected back to the increased mobility promised by the automobile in a huge social, political, economic and technological feedback loop. In retrospect social scientists can see these trends all synergistically coming together to build the world we have today. But this world was not planned or even envisioned. The inventors saw a horseless carriage, not a revolutionary engine of social and economic change.

The World Wide Web is today pummeling us with similar unintended and unpredictable changes. I recall in 1992 a friend came to me to tell me that the whole world was going to change. He had just returned from CERN in Switzerland seen the very first web browser. How prophetic it was for him to see the revolutionary power of this invention! At the same time, the web browser was an idea whose time had come. There was a confluence of technologies, applications, and most importantly networked devices that provided the springboard for revolutionary change. After the internet was expanded from a tool for the military and scientists to the commercial sphere – and hence potentially to everyone – it was inevitable that something like a web browser would make the interchange of information more transparent and easier.

We truly live in the Age of Information. This age began at least five hundred years ago. At the dawn of the information age, books were a precious commodity. In 1454 – roughly twenty years after the introduction of the printing press -- in all of Europe there were fewer than 30,000 books.

Then a wonder occurred. By 1500 there were over nine million books in Europe. Gutenberg's invention of the printing press was easily the most important, the most liberating, invention of the last thousand years. Information exploded across the continent and the modern age was born. Newton, Voltaire, Shakespeare, Luther, Mozart, Austin, Einstein: our modern world simply could not exist without Gutenberg's invention. The printing press launched an information revolution that continues to shape the modern world.

The printing press became an engine that interacted with and accelerated other changes waiting to happen. This was a highly disruptive technology: only sixty-six wester European institutions have had a continuous existence since 1530. Martin Luther became the first media superstar whose face was known internationally: all of his works included his image. The religious, social, economic, and political changes that deconstructed the medieval world and created the modern world were all possible because of this one invention.

In December of 1969 the first computer network was created connecting four computers. Today over 1.2 billion people worldwide are connected using this technology. In the US alone there are over two billion devices connected to the internet. This information explosion already far outpaces the Gutenberg revolution. Information is, at its core, liberating: it frees us to make new choices, based on new knowledge, new ideas, and new communities. Our choices today about how we share this information and what communities we build will shape future generations in ways we cannot begin to imagine. This massive explosion of information presents a problem both new and old. In 1454, with only 30,000 books in Europe, finding a book was the challenge. Fifty years later, with over nine million books in Europe, finding the right book became the challenge. Today, with over two billion devices connected to the internet, finding exactly the knowledge, information, or community you seek is daunting.

So, the future will look like the past, but it will also look different from the past. The world is changing in unpredictable ways but also staying the same in unpredictable ways. Another important principal is that the pace at which the world is changing is accelerating. It took fifty years for Europe to experience an information revolution growing from 30,000 books to nine million books. The internet has grown from four devices to over two billion in less time. This technology is interacting in synergistic ways with social and political and even linguistic changes in a massive feedback loop. When I was growing up in Iowa, salt was an exotic spice. Now you can buy sushi.

One thing we can learn from the past is that the future is coming at us with a relentless and ever-accelerating speed. My Mother rode a horse to a one-room school house and lived to see the internet. I personally remember when the first television came to our neighborhood. The world today is fundamentally different from the 1950's socially, economically and politically, linguistically. Yet it is the same – we still read books, watch movies, listen to pop music, form social networks. The changes are both profound and trivial: we have the world at our fingertips and we choose American Idol. Yet it is it the same – the Ted Mack Amateur Hour was the 1950's equivalent, with a cruel hook jerking contestants off the stage instead of barbed comments from the judges. Just as the present is visible in our past; the future is visible today. The trick, the probably impossible trick, is to predict what changes, what stays the same, and what evolves into something completely new.

If these broad trends are unpredictable, what are we to do?   One thing we can learn from the past is that we *can* learn from the past. If we have the right kind of education, an education that stimulates a nimble and nuanced intellect, we will be better able to cope with the accelerating pace of change. Education was the keystone to building the world we have today. I mentioned that list of sixty-six European institutions that have had a continuous existence since 1530. These include the Catholic Church, the Lutheran Church, and the parliaments of Iceland and the Isle of Man. The remarkable thing about the other sixty-two institutions is that they are all universities. Universities have been our anchor in an ever-changing world, they have been the beacons of our future and the guardians of our heritage.

So we know that the future will be like the past precisely because it will be new and different. We will see social, economic, demographic, technological and other changes. We will see these interact with one another in ways we cannot anticipate. When the internet was commercialized in 1991 by the *High Performance Computing and Communication Act of 1991* (otherwise known as the "Gore Act") no one could have anticipated the growth of social networking sites or political blogs. The changes we will see in the future will involve amplifications and interactions between trends already present in ways unknown and unknowable.

There are some trends, however, that we can expect to continue. For example the percentage of the population with an college degree has grown from less than 5% in 1940 to nearly 30% today. Moreover, the growth is almost linear.
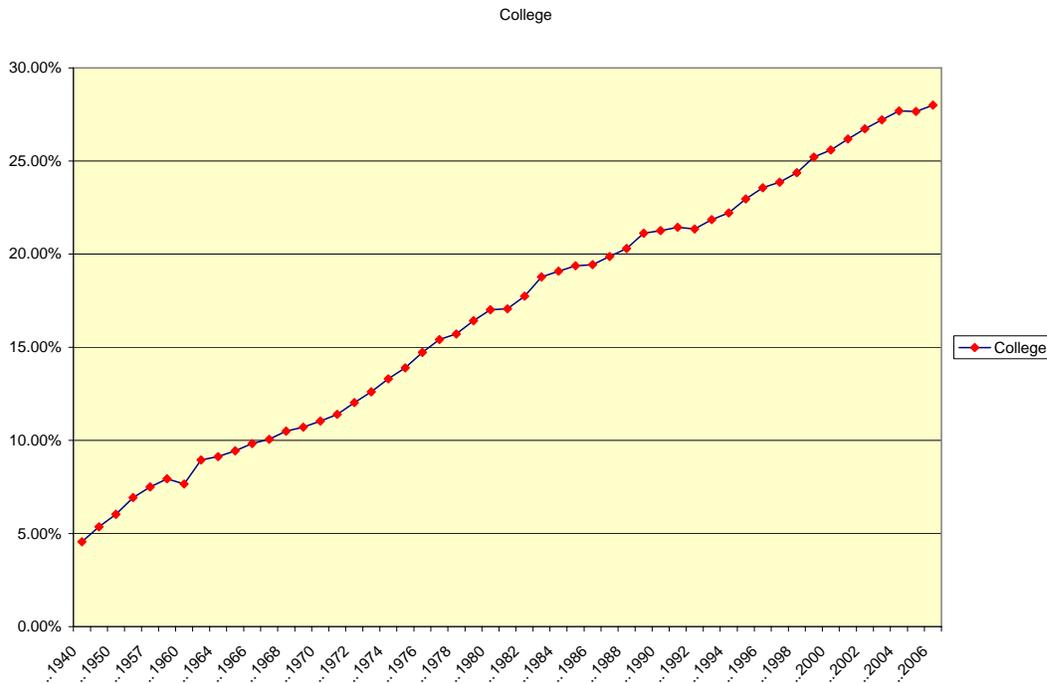
There is no reason to think that this trend will diminish – if anything the increased complexity of our economic and social systems would suggest that the curve would steepen. The most

conservative estimate is continued straight-line growth which implies that over fifty percent of the population will have a college degree by 2040.

Another way to consider the degree data is to look at the percentage of the population earning a college degree by year. The following table shows that percentage for bachelor's and for masters' degrees.

Degrees Awarded Per Year as % of US Population
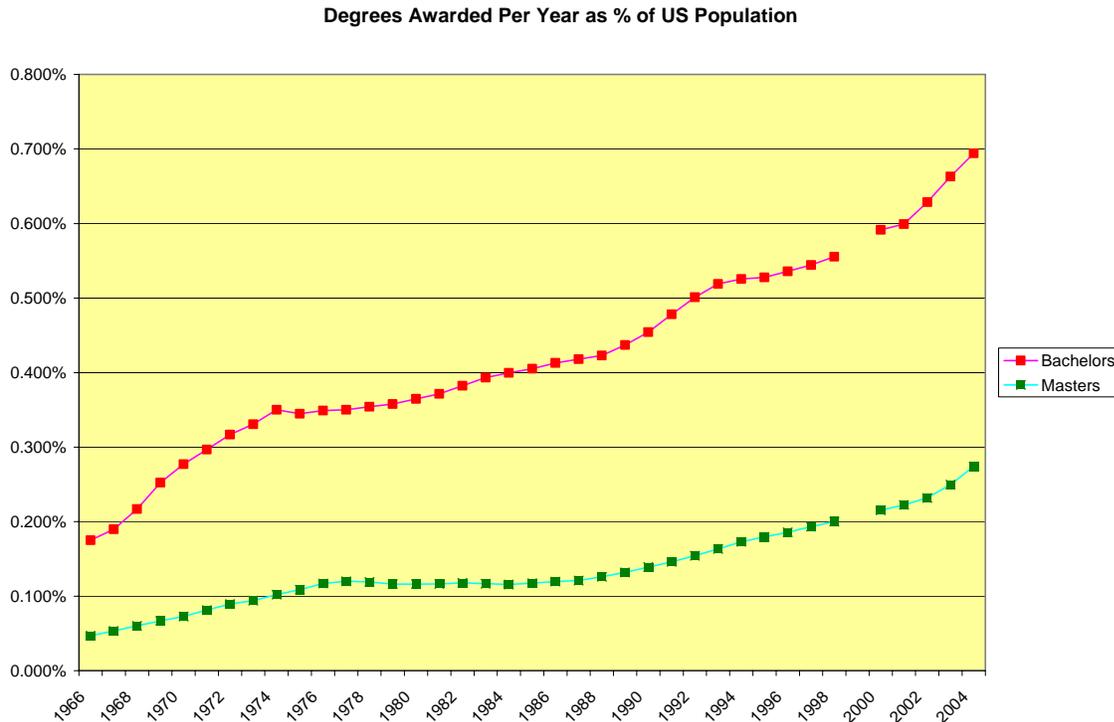
Not surprisingly both are going up with the masters' degree curve lagging behind the bachelor's degree curve by two or three years. This is expected since a bachelor's degree is a pre-requisite for entry in a masters' program.

Another set of data have to do with job stability. There is folklore that a US Department of Labor study asserts that people change careers on average seven times in a lifetime, up from three times per lifetime in the 1950's. As nearly as I can tell, no such study exists since the meaning of "career" is indeterminate. There is some data on job changes, however, among baby-boomers. This data shows that boomers changed jobs, on average, 10.5 times between ages 18 and 40. The median time in an employee's current job is roughly four years, a figure that has been fairly constant for the last ten years. Younger workers tend to have shorter tenure, but the job tenure appears to be stable across time for each cohort.   However, on average, one in twelve filled employment positions will disappear in the ensuing three months.

So we have these two existing trends:
- increasing rates of graduation at both the undergraduate and graduate levels; and
- a fairly high level of job turnover and job obsolescence.

How might these interact with each other and with the accelerating pace of social, economic, and technological change?

It is my contention that these data imply we will see increased demand for masters-level education. At OU-Tulsa our graduate student population consists almost exclusively of adult learners who are returning to school. The motivation is almost always to acquire specific professional skills in order to become more competitive in the job marketplace. In some cases, students are already or are about to become victims of job obsolescence. In other cases the global economy has resulted in their jobs being out-sourced to an overseas location. Many of these students are returning for a second or even a third masters' degree.

At OU-Tulsa we have explicitly designed a number of masters level programs with this group of learners in mind. The Master of Science in Knowledge Management is a case study in this. We had observed that many of the graduates of our Master of Library and Information Studies degree were being hired by industry instead of by libraries. At the same time, the Tulsa Chamber of Commerce had organized a series of forums to discuss the higher education needs of business, industry, government, and service organizations in the region. A recurring theme that ran through these forums was a need for information professionals who were skilled in project management and change management, who understood business processes and who could leverage the knowledge base of the organization into a financial asset. This resulted in the creation, with industry partners, of the Masters degree in Knowledge Management.

Similar studies and partnerships led to the creation of professional degrees in organizational and industrial psychology and to structural redesigns of existing professional degrees. All of this anticipated a national initiative, led by the Council of Graduate Schools and funded by the Sloan Foundation, to reinvigorate the Masters degree. The national goal is to professionalize the masters degree in the sciences and other disciplines precisely to meet the needs of returning learners and respond to the emerging demographic and economic trends mentioned above.

The masters degree is particularly well suited to respond to these trends and needs. It is short, usually only two years. It is highly specialized and so able to focus like a laser beam on emerging technologies, and on emerging social and economic issues. It is nimble in that it can be readily redesigned to accommodate changing circumstances. By introducing professional elements into the degree design and implementation, it can be re-envisioned to meet the economic, technological and social needs of the returning learner.

I will go out on a limb. The localities that invest in professional masters degree programs will enjoy increased economic vitality and more robust responses to social, technological and demographic changes. In order to meet the needs of the learners, the degrees will need to be offered in a "just in time" learning format that includes weekends, evenings, online learning, and compressed formats. Successful programs will take advantage of emerging technologies to build virtual learning communities in partnership with working professionals in the community. Localities that do not have this vision will struggle to meet the workforce needs of the future.

Thus I predict that the professional masters degree will become a fixture of the future. The degrees will be offered in non-tradtional formats, mediated by emerging technologies, building learning communities both online and in real time. If traditional universities do not do this, then

for-profits will. Indeed, we are already seeing this trend nationally with the advance of the University of Phoenix and other for-profit educational entities.

The future is full of unknowns. I haven't talked about the many challenges that could befall us. Globalization surely threatens job stability even as it stitches the world together and makes goods and services less expensive. The digital divide endangers social cohesion and runs the risk of "information haves" and "information have-nots." The transition from a print-based knowledge society to a multi-media based knowledge society runs the risk of trivialization of information systems: it is possible that we will choose the most visually appealing ideas rather than the most intellectually rigorous. But none of these challenges are really new: each of them has had their own historical analogue. The pace and global nature of the challenges is surely new, but humans have shown a remarkable versatility and tenacity to not only survive but to thrive. My final prediction is that it is a pretty safe bet if you believe in the human the capacity for survival, innovation, tenacity and, of course, compassion.