

Chapter One.

Nine Shift: Work, life and education in the 21st century

Every once in awhile, a technology comes along that is so influential that it changes the way we live. Work, life and education are reorganized around the technology, and it defines a given age. Such is the case with both the automobile and the World Wide Web, which we will refer to by its more common name, the Internet.

Before proceeding with explaining our new research and thinking about how education must be, and is being, transformed, we have to summarize the economic changes which necessitate the transformation of education at this time. This chapter is a review of our earlier book “Nine Shift: work, life and education in the 21st century.” It intentionally restates, in considerably condensed form, the underlying technological and economic changes that have created the new economic era of the Internet Age and the new conditions which require learning, teaching and education to be redesigned.

The Internet is the physical structure connecting computers all over the world, a structure created in the late 1960s by scientists, universities and the Department of Defense of the United States. The World Wide Web was begun in 1989 and completed around 1992 by British computer programmer Tim Berners Lee, now Sir Tim Berners Lee, when he was working for the nonprofit organization CERN in Switzerland. The World Wide Web is the common language, including the “http://” and hypertext which allows everyone to communicate using the Internet. While understanding the difference between the Internet and the World Wide Web, for simplicity sake we will refer to this technology as simply the Internet.

There are more important inventions, to be sure. Electricity and the printing press are two. But their influences span the centuries and do not define a particular age. Electricity has been equally valuable in the 19th, 20th and 21st centuries. The printing press has played a critical role in society for the past 500 years.

There are also many inventions that have become universal, yet have not substantially changed how we work or live. Movies, television, radio and airplanes are a few examples. The airplane, for instance, changed how we travel, but has not fundamentally changed how we shop, where we live or the basic nature of our jobs.

A transformative technology changes how we live. Here's how it happens.

- The technology changes the economy, including the means of production, how we build things, buy things and sell things.
- The new economy then changes the job structure, including what jobs are needed, valued and available.
- The new job structure then changes the work place, and how we work.
- How we work and earn a living are so central to life that home and family are impacted.
- The new living situation then determines the nature of our local community.
- The new economy, new job structure, and nature of work also determine how we prepare young people for the workplace, and so education and schools are redesigned.
- Finally, all of the above changes lead to a new set of values and attitudes.

The changes are not totally sequential. Many of them occur concurrently. And the changes are not completed all at once. They may take several decades to play themselves out. But all in all, this is how it happens.

One hundred years ago the technology of the automobile changed life. (1) Here's how the sequence of change played out in the 20th century.

- The automobile created a mass demand for goods, and the auto's cousin the tractor created a decrease in the number of farmers needed for the production of food. This led to a significant increase in the output of factories and mass production of goods.
- The increase in factory output led to a dramatic increase in factory and office jobs, and the decline of farm jobs.

- The factory and office led to the organization chart and the behavioral norms and expectations of the factory and office. A few examples include the 40-hour work week, first, second and third shifts, starting work at a precise time, hourly wages, and supervision and middle management.
- The industrialized work situation led to greater family mobility, the nuclear family and the decline of the extended family.
- The nuclear family led to suburbs.
- The factory and office led to mandated universal high school education, the consolidation of schools, age-grades, and schools that look and function like offices and factories.
- New values and attitudes set in. They include shopping on Sunday, driving on Sunday, moving as a positive sign of upward mobility, and much more.

The 20th century is widely called the “Industrial Age” because industry jobs (factory and office) rose to constitute half of all the jobs in the economy during the century. The Industrial Age is not the same as the Industrial Revolution, which took place in the early 1800s. The factory was created in the Industrial Revolution. But factory jobs did not surpass farm jobs until the 20th century, the Industrial Age. In 1900 close to half of all Americans lived on farms. By 1920 factory employment had surpassed farm employment, which continued to decline as a percentage of workers. (2)

The same scenario is playing out now with the Internet, impacting work, life and education changes once again. Here’s how it is playing out in the 21st century.

- The Internet has created a different kind of economy, one in which mass customization is possible, information and knowledge are critical, distance is no longer a barrier (and sometimes is an advantage), intangibles such as speed, design and customer service rise in importance, and technology takes over an ever-growing number of routine tasks for people.
- At the same time, the resulting technology allows manufactured goods to be produced by fewer factory workers, as well as in countries where labor is less expensive, causing a huge decline in the number of people employed in manufacturing.
- The technology creates knowledge jobs, those jobs which utilize a person’s thinking skills to a high degree. Knowledge jobs in this century are the most valuable jobs. Knowledge workers earn more than workers in other sectors. Knowledge workers also

- create an average of four additional local jobs in the community.
- Knowledge workers grow in number, and find that they not only can do their work at home, but that they can do it better from home.
 - With a workforce now primarily working from home, companies find that not only are physical offices a liability, but that intranets can accomplish what the office used to do, and the intranets can do it better.
 - With people working from home, they become linked to each other in relatively small business units that are more flexible and efficient than in large departmental structures. Organizations are thus reconfigured into networks instead of the pyramid of the organization chart.
 - With time being the principle resource of a knowledge worker, time becomes far more valuable. Consequently people desire shops, stores, clubs and centers close to home. Thus communities become much denser.
 - Commuting becomes unnecessary and driving wastes too much time, so knowledge workers switch to trains and light rail for transportation, able to work while they are traveling.
 - Social structures, government policy, federal and state safety nets are all redesigned around the new economic reality of the 21st century.
 - To prepare young people for this new work environment, schools and colleges become web-based, just like the business organizations in which students will work.

The economy of the Agrarian Age was based on the farmer. The economy of the Industrial Age of the 20th century was based on the factory worker. The new economy of the 21st century for post-industrial nations depends upon, revolves around, and is driven by knowledge workers.

In the last century, factory jobs were prized because every factory worker created four additional local jobs in the community. Factory goods were sold outside of the community, so money came into the community from other communities, states, even other nations, and that money created an average of four additional jobs for every factory worker. This is why so many communities had industrial parks in the last century, because recruiting factories to one's town meant significant additional local employment. In this century, knowledge workers are the most important work sector, because each knowledge worker

creates an average of four additional jobs in the local community. Again, the work or intangible output of a knowledge worker is used outside of the community, in other states, and in other nations, and again money comes in to the local community from that knowledge job, once again creating additional local jobs.

Economists tell us that communities grow and prosper when outside money comes into that community. When the grocery store worker buys clothes, and the clothing store worker buys groceries, not as much economic growth is achieved because local existing dollars are just moving back and forth in the community. When a knowledge worker buys groceries and clothes, however, she or he uses money that came in from outside of the community, and these new non-local dollars create more economic activity. So we will need welders and retailers and electricians in this century, but a community's economic prosperity will be dependent on how many knowledge workers it has, bringing in new outside money into the community with which to pay welders, electricians and retailers.

The concept and term knowledge work and knowledge worker was created by the business and management guru Peter F. Drucker. Drucker accurately predicted and explained how and why knowledge workers are emerging and changing the nature of business organizations. He wrote, "Both in its speed and its impact, the Information Revolution uncannily resembles its two predecessors within the past two hundred years, the First Industrial Revolution of the later eighteenth and early nineteenth centuries, and the Second Industrial Revolution of the late nineteenth century." Drucker predicted, "The Next Society will be a knowledge society. Knowledge will be its key resource, and knowledge workers will be the dominant group in its work force." (3)

Knowledge workers will become from 25% to 50% of workers in society, but more importantly, they become the most valued work sector in the economy, what Drucker called the "dominant" sector. Knowledge workers produce intangible goods as opposed to tangible goods, which the manufacturing sector produces. Some examples of intangible goods are data analysis, financial services, consulting, virtual models, training, and management.

Because the economy becomes more specialized, segmented and niched, knowledge workers are very specialized and work in very segmented and niched occupations and professions. They say in the last century there were dozens of jobs for millions of people and in this century there are millions of jobs for dozens of people.

Knowledge workers generally need a four-year college degree for at least two reasons. One reason is that the changing nature of the knowledge economy means that it is very difficult to prepare a student for a specific job. Another reason is that knowledge workers usually require the higher level of learning and knowledge that comes from a four-year college or university course of study.

We know, backed by statistics but also history, that knowledge workers are succeeding factory workers as the most valuable work sector.

In 1900, at the beginning of the last century, farm workers were 50% of those employed in society. Then as the economic impact of the automobile took effect, the percentage of people employed in farming declined and the percentage of factory workers increased. Between 1910 and 1920 the percentage of workers in factory jobs surpassed the percentage of workers who were farmers, and we went from the Agrarian Age into the Industrial Age. The percentage of workers in factory jobs rose to an average of 35% of employees, and peaked at 50%.

In 2000, at the beginning of this century, factory workers were the dominant work sector. Then as the economic impact of the Internet took effect, the percentage of people employed in factories declined and the percentage of knowledge workers increased. As Drucker explained, “The blue-collar worker in manufacturing industry and his union are going the way of the farmer. The newly emerging dominant group is ‘knowledge workers’.” (4) Between 2010 and 2020 the percentage of knowledge workers will surpass the percentage of workers who are factory workers, and we will officially leave the Industrial Age and enter the Internet Age.

Because the technology of the Internet is so powerful, just like the technology of the automobile was, no one or no entity can reverse the trend. Like it did 100 years ago, life has to change again in accordance with the requirements of the Internet Age.

Employment determines where we live, how we live, what we are able to do in much of our non-work time, and much more. Just as it was nigh impossible for most people to work in a factory and then return home at night to the family farm, so it is nigh impossible for most people today to work as knowledge workers and then return at night to a life embedded in the Industrial Age.

Suburbs, commuting, malls, two-week vacations and television were just some of the products of life in the Industrial Age. In the

same way, as we move into the Internet Age, so life and education get redesigned for this new way of life. This is a nine shift.

Thus, in just twenty years, from 2000 to 2020, some 75% of our lives is changing. We know this because it happened once before. Between 1900 and 1920 life changed as we moved from the Agrarian Age into the Industrial Age.

The term “nine shift” is used to describe the great changes taking place in our lives right now. What we are experiencing in how we use our time, and how we experience life derives from the phenomenon that nine hours in your day will be spent differently in 2020 than they were spent in 2000.

There are 24 hours in a day. We have no real discretion with roughly 12 of those hours. We need to eat, sleep and do a few other necessary chores in order to maintain our existence. That leaves approximately 12 hours a day where we, as individuals, do have some discretion. That includes work time, play time and family time.

Of those 12 hours, about 75%, or 9 hours, will be spent differently a few years from now than they were spent just a few years ago. Not everything will change, but 75% of life is in the process of changing right now. That same kind of change occurred between 1900 and 1920 as well. Frederick Allen called it “the big change” in his 1952 book by the same title. (5) We call it a nine shift.

By 1920, almost all of the major inventions of the century had seen the light of day. They included radio, movies, airplanes, the gasoline engine, and more. About the only device to have a major impact on us that had not yet been invented was the television. Yet even there, the visual language for television was established by 1920, according to television and communications expert Kathleen McMonigal.(6)

More importantly, by 1920 almost all of the major aspects of 20th century life had emerged. They include suburbs, commuting, offices, factories, the National Football League, women’s right to vote, and possibly most importantly, the ubiquitous organization chart or pyramid.

In terms of education, by 1920 most of the features of education of the last century had been devised, including the factory school model, the Carnegie Unit measurement of learning, community colleges, and more. The rural one-room schoolhouse was in decline. Normal schools, those post-secondary institutions that prepared people to become one-room schoolhouse teachers, were being redesigned to become teacher colleges and then state universities.

In our earlier work we were alone in predicting nine major changes

would take place in society. We now have clear evidence that all nine shifts are coming true. The nine shifts.

Shift One. People work at home.

Commuting to an office becomes a rarity, a thing of the past. A significant part of the workforce works from home or from one or more other chosen locations instead of commuting to a central office. People who work from home are 25% more productive than people who work in an office. They often work longer than office workers, yet have more free time for their families and leisure time. People who work from home are less stressed, healthier, safer and more connected to their local communities and to their children and families.

People who work from home are able to work during their peak productivity hours. Peak productivity time, like peak learning time for students, is not the same for every person. Some 50% of people are most productive in the morning, and 25% of people are most productive in the afternoon. But 20% of people are most productive in the evening, well after most offices have closed, and some 6% of people are most productive overnight (the percentages equal 101% due to rounding). One consequence of this is that people who work from home have a greater sense of the value of time, the most important resource for knowledge workers.

Since we made this prediction, the number of teleworkers has steadily increased, and the percentage of workers engaged in working from home has also steadily increased. Working from home will soon become the norm for employees with any business organization, including corporations, government and education.(7)

Shift Two. Intranets replace offices.

As offices decline, they are replaced by Intranets. Intranets are password-protected web sites designed specifically for the communication, work and needs of people working in a given company, business or organization.

The job descriptions of people who work from home change from activities or inputs to outcomes and results. As a result, people working from home can be supervised better from a distance than office workers are supervised face-to-face.

Intranets also allow organizations to recruit the best people, no matter where they live. Knowledge organizations require human resources

with very specialized skills, and organizations compete best when they have the best people. Intranets allow organizations to maximize their human resources, and Intranets allow workers to communicate, be supervised, and get work done in a flexible manner that optimizes the quality of both work and leisure time for teleworkers.

Shift Three. Networks replace pyramids.

The basic organizational structure of work in the last century, the organization chart or pyramid, is in steep decline. It is being replaced by a superior organizational structure, the network.(8)

The pyramid or organization chart is dysfunctional for the 21st century in several ways. The pyramid concentrates knowledge at the top, whereas in this century everyone in the organization needs access to all of the information in the organization in order to maximize their performance and solving of problems. Organizations with a pyramid structure have to waste some of their best people in supervisory positions, supervising the work of others instead of producing income or cost savings themselves. Organizations with a pyramid structure have interlocking and interdependent units or departments, meaning that units or departments are often limited in their ability to get tasks done by a dependency on another unit or department. And of course the pyramid creates a hierarchical reward structure so that only a few chosen people and positions are valued most highly, while most people and positions are valued less with the opportunity for advancement only at the expense and comparison of others in the organization. The pyramid inherently compares people to other people within the organization, assigning a worker's value based on the value of others rather than on one's own achievements, outcomes and results independent of the value of any other person in the organization.

For these reasons, the pyramid is collapsing while the network is emerging as the organizational structure of the 21st century. In their book *The Centerless Corporation*, Bruce A. Pasternack and Albert S. Viscio described the network as being composed of business units. Each business unit has a central function or purpose, and each business unit has the resources necessary to do its job. A business unit might be one or two people, or as many as twenty or more.(9)

People in a business unit might, and often do, work with each from a distance. People in different business units communicate with each other based on each other's need for information, not based on any pyramid-based permission or information allocation system. People have

access to people and information whenever and however they wish or need to get their jobs done.

Someone working at IBM described to us the transition in communication from a pyramid structure to a network in his company this way. “Before, if I emailed the vice president of another division, I would have been fired. Now if email the vice president of another division and she does not respond, she gets fired.”

Advancement for individuals is no longer dependent on rising above someone else in the organization. Individual reward is based on value to the organization instead of an artificial comparison to someone else or another position in the organization.

For the leadership of the organization, the network structure also allows the organization to be more flexible, adaptable, and changing according to the changing circumstances of the business environment.

Shift Four. Trains replace cars.

The automobile, the dominant mode of transportation in the last century, is losing its dominance and becoming peripheral and supplemental mode of transportation. Trains and light rail are becoming the dominant modes of transportation.(10)

There are three major reasons why trains are replacing cars.

1. One cannot work and drive at the same time. On a train or light rail, one can work and travel at the same time. Time is so valuable to knowledge workers they cannot afford to waste two to three hours a day driving, some 25% of their productive time. Economically, workers and businesses simply cannot compete successfully wasting 25% of their productive time.
2. Cars are destroying the environment.

For Generation Y, the car is responsible for an unacceptably high proportion of pollution, global warming, killing of wildlife, water pollution, and energy consumption. When the related auto lifestyle of suburbs, lawns, offices, malls, and sprawl are included, the cost of automobiles for the environment simply outweighs their value to this generation.

Trains and light rail make substantially less environmental impact to the point where trains and light rail are sustainable environmentally. While autos in the United States require asphalt and paving land equivalent to the size of Georgia, train tracks take up substantially less space with less pollution. While trucks and cars get between 10 and 50

miles per gallon, a freight train can transport one ton of material 454 miles on a single gallon of gasoline at one-third the cost of truck travel.

3. Cars kill too many people.

Cars kill over one million people a year worldwide. Despite laws, safety classes, and improvements in cars, the death statistics have not declined much. Many of these deaths are simply unavoidable, according to Malcolm Gladwell, who writes, "Every two miles, the average driver makes four hundred observations, forty decisions, and one mistake. Once every five hundred miles, one of those mistakes leads to a near collision, and once every sixty-one thousand miles one of those mistakes leads to a crash." (11)

For young people, cars are the leading cause of death. As the large Baby Boomer generation ages, cars become an ever-more-deadly way of travel. (12)

The cost to society is just too great in terms of lost talent and the loss on a human and family level. Like airplanes, trains have a safety record that can save thousands of lives a year, providing safe transportation.

There are many other reasons why trains and light rail are replacing cars, of course. Some of them are that trains are faster than cars, cars take up space in storage, cars require insurance, there is no drunk driving on a train, and many more.

Shift Five. Dense neighborhoods replace suburbs.

Suburbs and suburban sprawl are coming to a halt, and then suburbs recede and even become destroyed as they become financially valueless. Towns and cities already are being reformulated around dense communities composed of shops, stores and homes within walking distance of a light rail or train station.(13)

Shift Six. New social infrastructures evolve.

The increasing inequality in wealth between the rich and the rest of society comes to a halt. The unsustainable inequality in wealth of 100 years came to a halt and then the income gap closed as necessary social reforms took place to sustain the growing middle class of the last century. For the very same reason, the inequality of wealth in society today is addressed, and a variety of social reforms are implemented to create a new infrastructure for the general good of everyone in society, restoring more of a balance in income distribution.

Shift Seven. Cheating Becomes Collaboration.

New values, work ethics and behavior of the 21st century take over. For example, taking less time to learn or accomplish something becomes more valuable than devoting more time to the task. Working in teams becomes more valued than working independently. Hacking becomes a valued skill, seen as a way to find out how something works. Collaborative learning is encouraged and taught.

Shift Eight. Half of all learning is online.

The traditional classroom rapidly becomes obsolete. Half of all learning is done online overall in education, changing the nature of how we learn and how we teach. Hybrid or web-enhanced learning that incorporates both online learning and face-to-face learning becomes almost universal and commonplace, replacing the traditional face-to-face learning with a superior mode of learning.

Shift Nine. Education becomes web-based.

Brick and mortar schools and colleges of the past century are outdated. All education becomes web-based, providing a better education for both young people and adults.

Learning, teaching and how education is structured and delivered are transformed as a result and consequence of the transition from the Industrial Age to the Internet Age. As we now explore the implications for learning, teaching and administering schools and colleges, all of the concepts, practices and strategies relate in some part or all to the economic and lifestyle requirements of the 21st century. The Pedagogy of the 21st Century responds to the new needs of our students in preparing them for work and life in the Internet Age.