INTRODUCTION

The research in this paper draws heavily from sources in the United States. This does not, however, limit its significance to other countries for the U.S. leads the world in its commitment to the economic trends discussed here. As the four leaders of the United Kingdom, the Netherlands, Sweden and Germany noted in September 2000, “We all embrace the potential of globalization. In fact our shared political conversation symbolized political globalization. But we are also committed to tackle the clear problems that come in its wake.”¹ This paper hopes to add to this international dialogue by viewing the dramatic economic changes of the last decades of the 20th century through the lens of our equally revolutionary understandings about human learning and brain development.

TECHNOLOGY & THE CHANGING ECONOMY

The 1990s saw communist countries throughout East-Central Europe discard communism and work towards the development of free-market economies. Countries in Latin America increasingly freed state-owned monopolies for private ownership and the rigors of international competition. Even in those countries where anti-capitalist and anti-colonial feelings were strongest, such as China and Vietnam, they moved towards capitalism in the 1990s. The British Chancellor of the Exchequer, Gordon Brown, captured the scale of these changes in a speech he gave in the summer of 2000 when he noted, “Over the last 30 years, world trade has increased from around $300 billion to over $5000 billions, a 15-fold increase; the amount of international capital from around $600 billion to over $8000 billion, a 13-fold increase. And foreign investment has increased from around $10 billion to over $600 billion, a 50-fold increase.”²

Among an increasing number of countries, economic globalization has led to more economic openness. Today’s most productive economies are open to trade, international finance and economic competition. They are also open to a constantly changing job market. As Chancellor Brown noted, “reforms in Britain and Europe are built on the new realities of the global economy – opened not sheltered economies. International not national capital markets, global not local competition.”³ These economic changes have been driven in large part by advances in the

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technologies of information and communication, and the reorganization of firms, industries and markets this technology has triggered.

For the American perspective, President Clinton argued in the spring of 2000 that the convergence of the power of information communication technologies (ICTs) with a more open global economy has in effect created a “new American economy.” According to the President ICTs “represent only 10 percent of American jobs, but is responsible for about 30 percent of our economic growth. It accounts now for about half our business investment. And just as Henry Ford’s mass-produced cars and the assembly line itself had broad spillover effects on the productivity of the American economy, these new technologies are doing the same thing, riffling through every sector of our economy, increasing the power of American firms and individuals to share broadly in its prosperity.”

The President continued, “Today, information technologies allow industries to recognize instantaneously changes in demand, and to manage their inventories more efficiently and quickly. They are speeding the development of new products to market. Supercomputers, for example, have helped Detroit auto makers cut the development times of new cars by half or more. They’ve helped pharmaceutical companies cut down the development time for new anti-cancer drugs by several years. Clearly, they will have a profound effect, information technologies, in biomedical sciences in the 21st century, as we see by the simple fact that in the next few weeks, we will announce for the first time the complete sequencing of the human genome, something that will have been literally impossible without information technology.”

The Chairman of the U.S. Federal Reserve, Alan Greenspan, has less political interest in hyping the U.S. economy, yet even he acknowledged recently that “while there are various competing explanations for an economy that is in many respects without precedent in our annals, the most compelling appears to be the extraordinary surge in technological innovation that developed through the latter decades of the last century.” Chairman Greenspan described what these changes have meant for the U.S. economy at the beginning of the 21st century:
“Before this revolution in information availability, most 20th century business decision making had been hampered by pervasive uncertainty. Owing to the paucity of timely knowledge of customers’ needs, and of the location of inventories and materials flowing throughout complex production systems, businesses required substantial programmed redundancies to function effectively. Doubling up on materials and people was essential as back up to the inevitable misjudgments of the real time state of play in a company. Decisions were made from information that was hours, days or even weeks old.

Accordingly, production planning required costly inventory safety stocks and back up teams of people to respond to the unanticipated and the misjudged. Clearly, the remarkable surge and the availability of more timely information in recent years has enabled business management to remove large swaths of inventory safety stocks and worker redundancies. That means fewer goods and worker hours are absorbed by activities that while perceived as necessary insurance to sustain valued output, in the end produced nothing of value. These developments emphasized the essence of information technology. The expansion of knowledge and its obverse, the reduction of uncertainty. As a consequence, risk premiums that were associated with many forms of business activities have declined.

In short, information technology raises output per hour in the total economy principally by reducing hours worked on activities needed to guard productive processes against the unknown and the unanticipated. Narrowing the uncertainties reduces the number of hours required to maintain any given level of production readiness. Because knowledge is essentially irreversible, much, if not most, of the recent gains in productivity appear permanent.”

The key concepts to remember about Chairman Greenspan’s comments are: 1) the economic transition started in the 1980s towards increasing use of ICTs, and other technologies, to make businesses leaner paid dividends in the 1990s, 2) more accurate and up-to-date knowledge about market conditions means fewer workers are needed to produce and deliver more goods and services, and 3) in short, this means businesses are able to work smarter than they were able to in the past. It also means that today’s workers are expected to work smarter. This paper will explore
The impact that the shift towards a more knowledge-based economy has had on Americans, and in particular on children’s learning.

TECHNOLOGY & CHANGING CONCEPTIONS OF THE BRAIN AND LEARNING

The first point that needs to be made is that the powers of new technologies have also impacted greatly on what science now understands about the brain and how humans learn. While philosophers have for centuries pondered the workings of the brain, investigators have only recently been able to explore it in action. “The ability stems from developments in imaging technology that the past few years have seen, most notably positron emission tomography (PET) and magnetic resonance imaging (MRI). Coupled with powerful computers, these techniques can now capture, in real time, images of the physiology associated with thought processes. They show how specific regions of the brain ‘light up’ when activities such as reading are performed and how neurons and their elaborate cast of supporting cells organize and coordinate their tasks.”

These technologies reveal the brain to be a self-organizing open system that is shaped by its interaction with objects and events in the world. In adapting to events the brain’s molecular mechanisms physically adjust to its environment. What this view argues is that perception is colored by experience. We never hear something in a totally objective form, but rather our receptive processes are colored by those environmental stimuli that have captured our interest in the past. We build knowledge on earlier experiences.

According to the neurobiologist Lise Eliot, “Neuroscience has made tremendous strides over the last quarter century. Powerful techniques now allow us to visualize every part of the living brain in action, from the largest circuit down to the tiny gap between neurons, the synapse; to record electrical activity from single molecules in the brain; and to pluck out, from the enormous haystack of human DNA single genes involved in early neural development, mental retardation, and senile dementia, to name just a few neurological phenomena.”
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The U.S. National Research Council captured the essence of these changes when they reported in 1999 that, "Today, the world is in the midst of an extraordinary outpouring of scientific work on the mind and brain, on the processes of thinking and learning, on the neural processes that occur during thought and learning, and on the development of competence." The report continued, "The revolution in the study of the mind that has occurred in the last three or four decades has important implications for education."9

The 21st Century Learning Initiative, since the mid-1990s, has written extensively about the nature of human learning and brain development. The story we tell about learning is vastly different to the one that was told for most of the 20th century.10 A convergence of findings from the cognitive sciences, the neurological sciences, the biological sciences and even archeology and anthropology provide powerful insights into the nature of human learning. The following two bullet points briefly contrasts the industrial age assumptions behind learning and brain development that provided the "theoretical basis" for education during the 20th century with what is now known about the brain and learning from a synthesis of recent scientific research and experience.

- **Industrial age assumptions about the brain and learning** - Because so little was known at a technical level about the structure and operation of the brain, philosophers assumed that it was an empty vessel waiting to be filled. This meant that only direct instruction had any real impact on children’s brain development and learning. The early experiences of very young children were seen to be of little significance. In the late 1960’s the metaphor shifted to that of a linear computer waiting to be programmed, and so external inputs not intrinsic motivation were seen to drive learning. Learning and instruction were seen as being synonymous. The instructor, not the students’ brain, controlled the pace of learning. Differences in individual levels of intelligence were regarded as hereditary and immutable. Superior intellects were relatively few. Learning tasks were strictly gradated and emotionally neutered, because it was assumed that only a few youngsters as they got older and less emotional were capable of “real, meaningful learning.” Adolescents needed more direct instruction than younger children did because by this stage those who would make up the 10
percent or so of the population that would run a society's business, governmental and military bureaucracies were identified.

- **Today's understandings about the brain and learning** - Research now reveals the brain as a collection of specialized and complex systems, each engineered by natural selection to aid our species in decision-making. It is an open, flexible, self-adjusting, biological system that grows and reshapes itself in response to challenge, or withers through lack of use. The brain prefers to search and discover patterns for itself, it handles real, complex situations more easily than it does artificially contrived ones. Because the brain is always trying to make connections between existing patterns and new patterns, it not only acts rationally but also creatively, in so far as it is looking for unusual links. Each brain is as unique as those physical characteristics that give persons their individuality. No two people learn in the same way or at the same speed. Because learning actually changes the brain, the more someone learns the more distinctive does that brain become. Infancy and early childhood are defined by the brain's malleability, its predispositions to learn certain skills almost effortless (such as spoken language), and its dependency on others for appropriate stimulation. Adolescence is largely defined by the maturing child's predisposition to take responsibility for his or her own decision-making.

The contention that lies behind the rest of this paper is that at the close of the 20th century the citizens of developed countries find themselves living and working in a far more open and dynamic economy than earlier generations. This new reality was summarized nicely by the Secretary-General of the OECD Donald Johnson when he observed, "In the 'New Economy,' citizens are invited to take on more individual responsibility for shaping their own destiny. They have the opportunity to become more involved in their own decision-making that impinges on their own economic and social environment. Governments must ensure that their citizens are well equipped to assume these new responsibilities. But the people they govern, too, have to become active entrepreneurs and innovators. That means breaking down barriers in the mind, as well as barriers to trade, competition and innovation. In the 'New Economy,' an 'open' society, in every sense of the word, is the key to a favorable environment for growth."
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What this means for education and learning is that, “In the old economy of the past, of the industrial age, where brawn counted more than brains, we could get away with investing only in some of the potential of some of our children. But in the new economy, which depends on knowledge, ingenuity and innovation, on mobilizing the talents of all – getting the best out of everyone – it is essential to develop all the potential of all our children.”

Parallel to this economic shift, and the dramatic addition to educational goals, is an appreciation that the brain is an open and dynamic learning system. We now, in effect, have it in our power to design learning systems that are in line with not just the needs of the economy, but also the natural functioning of the brain. It is truly an exciting time to be alive, but as is the case in all revolutionary times there is a darkside lurking in the shadows – a society of gargantuan extremes. Consider the following facts before going any further, “The world’s 200 richest people more than doubled their net worth in the four years to 1999, to more than $1 trillion – an average of $5 billion each. Their combined wealth (the top seven are Americans) now equals the combined annual income of the world’s poorest 2.5 billion people. How much is $5 billion? If invested at 5.2 percent, that’s a steady income of $5 million per week.” According to James Wolfensohn, President of the World Bank, “three billion people live on less than $2 a day, and 500 million live under $1 a day, absolute poverty.”

THE INDUSTRIAL AGE MODEL - THE SYSTEM MUST BE FIRST

Politicians, central bankers, business leaders, and academics are now speaking about a new economy where old economic rules no longer apply. If indeed, we are witnesses to the creation of a new economy it would not be the first time such a shift has occurred. At the end of the 19th century the United States, the United Kingdom and much of Europe made the transition from an agrarian-based economy to one that was industrially-based. It is important to point out, however, that this economic revolution took more than just technological advances to come to fruition. It was only when the science of the day was applied to both technology and labor through a process known as scientific management that labor productivity rose and with it the standard of living.
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It was the American efficiency expert Frederick Winslow Taylor who epitomized scientific management more than anyone else. He melded his experience as an apprentice factory worker with his understandings of math and science from his university studies to develop a technique that would later be known as "time and motion studies." Starting at the Midvale Steel Works in Pennsylvania in the 1880s, Taylor sought to apply objective scientific data and models to human labor. He treated manual work as something deserving study and analysis, and by doing so he showed that the real potential for increased output was by "working smarter."

He was right. According to Peter Drucker: "The application of knowledge to work explosively increased productivity. For hundreds of years there had been no increase in the ability of workers to turn out goods or to move goods. Machines created greater capacity. But workers themselves were no more productive than they had been in the workshops of Ancient Greece, in building the roads of Imperial Rome, or in producing the highly prized woolen cloth that gave Renaissance Florence its wealth. Within a few years after Taylor began to apply knowledge to work, productivity began to rise at a rate of 3.5 to 4 per cent compound a year - which means doubling every 18 years or so. Since Taylor began, productivity has increased some fifty-fold in all advanced countries. On this unprecedented expansion rest all the increases in both standard of living and quality of life in the developed countries."16

There was a catch though. When Taylor spoke of "working smarter" he meant that a small team of engineering experts would work smarter, and then use their "scientifically based" insights to tell everyone else what to do, how to do it, and when. For most people, scientific management meant following orders and being paid good money for not asking questions. The fantastic increase in productivity through the introduction of science to the industrial process came at a cost to the average person’s initiative and learning. Working people no longer had any say in how they’d do their jobs, and consequently for non-management workers the workplace became highly repetitive, pressurized and strictly unthinking. In effect Taylor asked workers to “turn their brains off,” and let those who know better do the thinking.

Taylor’s book The Principles of Scientific Management, published in 1911, stated this clearly: "The primary, if not the only, goal of human labor and thought is efficiency; that technical
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calculation is in all respects superior to human judgement; that in fact human judgement can not be trusted, because it is plagued by laxity, ambiguity, and unnecessary complexity; that subjectivity is an obstacle to clear thinking; that what cannot be measured either does not exist or is of no value; and that the affairs of citizens are best guided and conducted by experts.\textsuperscript{17} The deification of efficiency and of the specialist had begun, and it came at the cost of most people's thinking.

While specialization has become a feature of modern society, it is not, however, particularly natural to the human brain that has evolved over the millennia to be a multi-faceted, multi-tasked organism that is predisposed to think about any piece of data, or idea, from very many perspectives. It works in terms of wholes and parts simultaneously. The glory of the human brain is that it is essentially a complex, messy, non-linear system that thrives in an open and challenging environment. This fact collides with the central premises of Taylor's industrial model of scientific management.

Taylor, of course, would have nothing to do with personal initiative and in his scheme of things craftsmanship was out and sense-making skills were deemed of no value. Productive work for the majority was no longer directly related to individual innovation and personal motivation. People were to be dumbed down and Taylor understood this with brutal clarity. "In the past man has been first," he said. "In the future the system must be first."\textsuperscript{18}

Taylor was only able to take control of the manufacturing process from the majority of workers by buying them out in a contract that precluded their individual thinking. Not surprisingly he initially faced much opposition from workers and their unions. A machinist gained prominence when he debated with Taylor in 1914 and remarked: "We don't want to work as fast as we are able to. We want to work as fast as we think it's comfortable for us to work. We haven't come into existence for the purpose of seeing how great a task we can perform through a lifetime. We are trying to regulate our work so as to make it auxiliary to our lives."\textsuperscript{19} It was to placate this resistance that Taylor refused to take a factory as a client unless the owners first substantially raised wages, sometimes tripling them. Taylor's principle for increased productivity was simple: "You do it my way, by my standards, at the speed I mandate, and in so doing achieve a level of
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output I ordain, and I'll pay you handsomely for it, beyond anything you might have imagined. All you have to do is take orders, and give up your way of doing the job for mine."20

In defense of Taylor, the principles of scientific management would help alleviate the great social problem of his day - the schism between capital and workers. Taylor expressed before the American Congress, and elsewhere, that by making manufacturing more efficient it would become more productive, and in the end workers would benefit most through higher wages, shorter work hours, better working conditions and increasing access to the technological wonders of the time. Peter Drucker observed in the 1980s that, "it is Taylor who defeated Marx and Marxism. Taylor's scientific management not only tremendously increased output. It also made possible increasing workers' wages while at the same time cutting the product's prices and thereby increasing the demand for it."21 What role Taylor played in making the world safe for capitalism is open to debate, but the principles of scientific management did enable a productivity miracle.

By the close of the 19th century science, technology, and capitalism were seen as intertwined, driving change from an agrarian society to a manufacturing one. The politics of the day were focused on how best to enable the majority of the population to share in the wealth and benefits of the new manufacturing order. Hence the rise in labor unions, child labor laws, compulsory education, anti-trust laws and pension systems. From the perspective of individual workers, however, the acceptance of Taylor's scientific management was a Faustian bargain. They traded their own way of working things out for methods authorized by experts managing the industrial process from above the system, and in turn they received higher wages.

After World War I, and the obvious success of American industrial production to provide the arsenal for the democracies, scientific management became influential outside of the United States as well as inside. The British were attracted to it due to their officer class mentality and their need to administer a vast empire. By 1920 a booklet by Taylor disciple Gustav Winter, How to Introduce the Taylor System in Germany, had sold 100,000 copies in Germany. And Taylor's influence was not limited simply to the West. Lenin was one of his greatest advocates, stating that "we must introduce into Russia the study and teaching of the new Taylor System and its

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systemic trial and adaptations."22 Lenin, it should be noted, was also a follower of the psychologist Pavlov and this gave a second scientific explanation for why communism could manipulate the human brain.

So persuasive were the successes of scientific management that it spread in many countries across all aspects of social organizations. Taylor suggested that the lessons of improved factory production "can be applied to all social activities: to the management of our homes, the management of our farms, the management of the business of our tradesmen, large and small; of our churches, or philanthropic institutions, our universities and our government departments."23

SCIENCE REACHES THE SCHOOLS

The overwhelming success of scientific management quickly spread into public schooling, and by 1910 Taylor’s influence "extended to all American education from the elementary schools to the universities."24 Primary players in taking the lessons of scientific management from the factory floor and applying them to social institutions, and in particular public schools, were the Carnegie Foundation for the Advancement of Teaching and the Carnegie Corporation of New York. Henry Pritchett was the first president of the foundation and remained in charge until 1930.

During this time he managed to put an enduring stamp on the shape of its educational efforts. "Pritchett turned the foundation into a proponent of systematization in American education, and through education, American life...His signal contribution...was to direct some of Carnegie’s wealth and power that came with it to the organization of American education along more modern, national, scientific, and bureaucratic lines"25 The factory school was delivered, ironically, through the wealth generated by the man who had such a strong affection for providing study in libraries.

Taylor’s success at merging the understandings of science with the processes of industrialization had a profound effect on the relationship of learning to education, the goals of education, theories of education and how it would be delivered. For starters, a primary aim of education
became preparing workers for their place in rationally planned manufacturing. In the United States the rhetoric of educational reformers and policy makers shifted from the early 19th century emphasis on preparing citizens for a democracy, towards how most efficiently social capital could be developed. Pritchet captured the spirit of the times when he argued in a 1907 speech that it is "more and more necessary that every human being should become an effective, economic unit." To accomplish this goal, what is needed is an educational system that is carefully adapted to the needs of the economy. Such a system must seek to produce economically useful knowledge and to sort people efficiently into the various positions that need to be filled in the stratified occupational structure,"26 he argued.

Key to being able to function in a scientifically managed factory was the ability to read basic instruction manuals, fill out order forms and worksheets, and do basic mathematical calculations. In other words to become an efficient economic unit one needed to be equipped with the three R's in order to navigate his way through the modern industrial workplace. The pedagogy that emerged in schools only took several decades for most countries to move literacy rates from the single digits into the 80 and 90 percentiles. Schools also served as sorting stations where individuals were separated to meet the various needs of the increasingly specialized labor market.

Education would identify, through a scientific merit-based process of sorting, those who should receive advanced education in order to move into managerial and leadership positions and those who should simply receive a basic education and then move directly out onto the factory floor. It was a system that operated under the premise that 10 per cent would lead and 90 per cent would follow. In 1897, Charles Eliot the president of Harvard, said: "The duty of democratic education, in addition to preparing a whole literate populace, was to cultivate the natural aristocracy, so that the whole community could benefit from the fulfillment of its ablest citizens ... and so that educational resources would not be wasted on those unable to employ them profitably."27

When one considers the remarks of Gordon Brown and others about "mobilizing the talents of all" this process of educational sorting may appear at first glance as undemocratic, but in the United States a hundred years ago it was widely accepted. It was seen by most as being a fair
system. It was the same for everyone. If you had natural "smarts" you’d be very successful and if you didn’t well then the system would sort you out, and give you the basic skills you needed to make a living on the factory floor. In theory it was designed to offer rewards based on merit rather than on such ascribed characteristics as class, race, and gender. Additionally, such meritocratic systems were seen "as an antidote to corruption, good-government advocates sought to centralize decision making in the hands of professional administrators. They became infatuated with the creed of scientific management, which promised to improve organizational performance and promote new levels of efficiency."\(^{28}\)

The factory system of education that emerged in the United States was not a uniquely American phenomenon. The English educational historian David Wardle noted the following about the English system: "It was the factory put into the educational setting...Every characteristic was there, minute division of labor...a complicated system of incentives to do good work, an impressive system of inspection, and finally an attention to cost efficiency and the economic use of plant."\(^{29}\)

This brief history lesson is important because the economic changes initiated in the early 1980s has entailed moving away from Taylor’s rigid scientific management system. Richard Rosecrance captured the significance of this transformation when he wrote, “Machines used to gear labor to their operations. Now humans and their purposes have been put at the center – not the periphery – of the production process. People shape, redesign, or ignore machines. In the most advanced locations, such as Silicone Valley, Seattle, Bangalore, and Kaohsiung, creativity in the workplace is now rewarded instead of being punished as a deviation from established procedures. The human being has begun to emerge from the straightjacket of the industrial system.”\(^{30}\)

It now pays to use your brain. Workers are rewarded for critical thinking, innovating and solving problems without direct instruction, for speaking and writing skills, and for being able to continuously learn on the job. Success is equated with continuously learning. As the short history above shows no education system has ever been designed to help all children acquire such skills and attitudes. In fact, no system alone can do it. Learning, like the economy, must now be seen
as an open and continuous process that requires the support of both educators and new partners. The new economy requires a new model of learning.

WHERE DO WE GO FROM HERE?

"The shift from a factory-based to a computer-based economy is more traumatic even than our great-grandparents' shift from a farm-based economy. The Industrial Revolution extended over generations and allowed time for human and institutional adjustment. The Computer Revolution is far swifter, more concentrated, and more dramatic in its impact," observes the eminent Harvard Historian Arthur Schlesinger Jr. This shift in economic systems has helped spawn an economic boom in the United States.

Yet, it must be noted, economic growth is not automatically synonymous with the general welfare of all citizens. That said, consumption possibilities are an important element in welfare. Money buys possibilities that poverty does not allow. In a society with an expanding economy the questions become how to make certain economic growth leads to rising incomes and improved opportunities for all citizens, and how to make certain that growth is not achieved at the expense of future generations? Anyone interested in the learning of children must address these key questions.

The forces of globalization and "the new economy" may bring a higher standard of living, better services and more choices, but they also require "the continuous discarding of obsolete factories, economic sectors, and even human skills. The system rewards the adaptable and the efficient; it punishes the redundant and the less productive." It is at times brutal. It is especially painful for those who learned the rules of the earlier system well, but who have now seen the rules changed -- a recent example is factory workers and miners in the former communist countries of East-Central Europe.

In the United States the economic changes of the past two decades has undoubtedly brought many benefits including 16 million new jobs since 1995 alone. But it has also brought "new insecurities -- about unemployment, about the durability of jobs and the stress of the workplace,
about the loss of protection from the vicissitudes of life, about the environment, about the unraveling of the safety net, about health care and what happens in old age. Workers – both white and blue-collar – fear, and sometimes find, that employers, in order to please financial analysts, will break the social contract and cut salaries, benefits, and jobs of employees who have given 15 or 20 irretrievable years of their life to the company.33

It is important to point out that, along with changes in economic policy, business practices, and technology, the American worker/consumer has been central to the economic growth of the recent past. For the average worker (many of whom are also parents) the new economy means working more hours. In 1999 President Clinton’s Council of Economic Advisers captured the trend when they observed, "The nation’s labor market is performing at record levels: the number of workers employed is at an all-time high, the unemployment rate is at a 30-year low, and real (inflation-adjusted) wages are increasing after years of stagnation."34

For an increasing number of Americans life has become synonymous with work. Americans now "put in more hours on the job than their counterparts in other industrialized nations. Americans work almost two weeks a year more than the Japanese and 14 weeks more than the Norwegians."35

All this work has enabled Americans to go on a buying binge, and thus keep the economy growing even during the global economic downturn of 1997-98. The 1990s were marked by American consumers buying more and varied goods and services than any generation in history. At the close of the decade the ambition behind the dream of a small suburban home with a family car and an annual vacation had expanded considerably. Houses have doubled in size in less than 50 years, and more people than ever before have a second home, multiple vehicles, watercrafts and other motorized machinery. The accoutrements of the modern home now includes several television sets, DVD players, stereo equipment, a personal computer or two updated every couple of years, and numerous other electronic goods and gadgetry. Designer clothes are now
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seen as mandatory not only for adults, but also for teenagers and even little children. For a vast swath of the middle-class much of this consumption has been facilitated by easy credit.

Despite an expanding economy over the past two decades the United States "borrowed approximately $5 trillion from the savers of the world, especially the Japanese, to finance their consumption and their investment. In the mid-1980s the United States went from its post-World War I position as the world’s largest creditor nation to become its larger debtor." Not surprisingly, an increasing number of Americans feel good about the shape of the economy, but paradoxically they feel increasingly stressed and unable to find time for what they really enjoy doing.

THE AGE OF ANXIETY AND INEQUALITY

These economic good times have an inevitable cost, and the price is incurred disproportionately by children who, for reasons noted above, now spend far less time with those adults who love them and more time with professionals whose job it is to educate them. The Organization for Economic Cooperation and Development (OECD) has noted that at the most basic level children "compete with ‘other’ goods and services that limited purchasing power can provide...The flood of options has induced a growing number of women to join the workforce in order to enlarge their purchasing power and take advantage of the increasing (economic) opportunities." As a result of increasing economic opportunities fewer children are being born in developed countries, especially to parents who have more than a high school education.

This fact helps to explain why in the United States “children make up 39 percent of the poor but only 26 percent of the total population.” The new economy rewards those who defer child rearing, or have no children at all, to seek higher levels of education. According to the U.S. Secretary of Labor, “In 1970, college educated men earned about 36 percent more than high school graduates. Starting around 1980, college educated workers began to fare substantially better than less educated workers. By 1997, the gap had nearly doubled to 62 percent. The results

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are even more striking for women. College educated women earned 23 percent more than high school graduates in 1970 and 65 percent more in 1997.41 It is interesting to note that there is an increasing tendency for men with higher-than-average earnings to marry women with higher-than-average earnings.42 This fact may help to explain why the current economy breeds increasing inequality in household earnings.43

The most often cited criticism of today’s economy is that it creates increasing economic inequalities both within countries and between countries. “Most economists believe that, while wages have improved in the late 1990s due to robust economic growth, income inequality among workers has increased since the 1970s. Moreover, the overall gap between rich and poor has also increased in Europe and elsewhere. Despite continuous economic growth and a low rate of unemployment, the benefits of economic ‘good times’ in the United States have been distributed unevenly, and many groups have been left behind.”44

The American situation can be summarized as follows: from 1945 until 1970, all income groups experienced economic advancement, including the poor. In fact, poor families during this period recorded the highest growth in annual real income during that time, which meant that the poor became less poor not only in relative terms, but in absolute terms as well. “Since 1973, however, the pace of income growth has slowed and income inequality has increased. Whereas median family income increased 10 percent between 1973 and 1999, income in the highest income bracket (95th percentile) grew more than a third while income in the lowest income grouping (20th percentile) remained virtually unchanged or actually dropped, especially for women. The real earnings of many low-wage and middle-class workers have stagnated or experienced only modest gains, while the more wealthy 20 percent of American families have gained greatly.”45

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<th>Measures of Household Income Inequality</th>
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<tr>
<td>Aggregate shares in 1998</td>
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<tr>
<td>3.6% Lowest quintile (bottom 20 percent of the population)</td>
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<td>9.0% Second quintile</td>
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<td>15.0% Third quintile</td>
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<td>23.2% Fourth quintile</td>
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<th>49.2% Highest quintile (top 20 percent of the population)</th>
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<td>21.4% of all US household income went to the top 5% of families</td>
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“In brief, since the 1970s, the standard of living of many American workers has grown very slowly, while income inequality has increased considerably.”\(^{46}\) Despite the fact that more middle-class Americans than ever are invested in the stockmarket through pension-funds and mutual-funds eighty-six percent of stock market gains between 1989 and 1997 flowed to the top ten percent of households, whereas 42 percent went to the most well-to-do one percent.\(^{47}\)

This helps to explain why inequality in wealth is even more skewed towards the rich than that of income. According to the economist Paul Krugman, “The distribution of wealth (the assets people own, whether in stocks and bonds, real estate, or whatever) does not look like the ‘bell curve’ beloved of statisticians. Instead it is best described by a ‘power law,’ a sort of elongated ski slope. Power-law distributions, unlike bell curves, have a lot of their mass far out in the right tail – which means, in this particular case, that a large share of the total wealth is held by a small number of families. To give you an idea of the implications: You may or may not be impressed to hear that 25 percent of US families own more than 80 percent of private assets. But well over half of the wealth of that 25 percent is actually in the hands of the top fifth of that group, that is, the wealthiest five percent of families. Roughly the same proportion of that wealth is actually in the hands of the top fifth of that group, the top one percent of families. And although our statistical vision starts to blur at high altitudes, it’s more or less certain that most of the wealth of the top 1 percent is actually in the hands of the top .2 percent, and so on up to Bill Gates.”\(^{48}\)

SOCIAL CAPITAL AND CHILDREN’S LEARNING

The reason for this brief focus on inequality is that it influences the environment in which children learn. First, in the United States educational funding is primarily drawn from property taxes. Consequently, rich communities almost always have better schools than poor communities, and increasingly in America it is only school districts in rich communities that have the resources to recruit new teachers, and most effectively utilize the power of information.
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communication technologies. But, more significantly, and this may surprise some readers, is the influence this economic inequality has on children’s out-of-school learning. Remember the brain is an open learning system and much of what children learn occurs outside the 20 percent of the time they spend in classrooms. As long ago as 1966 James Coleman’s Equality of Educational Opportunity study showed that in the United States student educational achievement was most strongly affected not by tools of public policy, such as teacher salaries and classroom size, but by the environment a child’s family and peers create.

Coleman, clarifying his position in 1987, wrote schools can make a difference, but they are greatly limited in their potential impact by factors relating to the family and the community. Coleman wrote, "as the Equality of Educational Opportunity report of 21 years ago first made clear, variations among family backgrounds make more difference in achievement than do variations among schools. This does not imply that ‘schools don’t make a difference.’ There is evidence that in the absence of schooling, children from whatever background learn very little of certain things, such as mathematics. What it does imply is that schools, of whatever quality, are more effective for children from strong family backgrounds than for children from weak ones. The resources devoted by the family to the child’s education interact with the resources provided by the school - and there is greater variation in the former resources than in the latter. The strategy of career-and-income oriented households in shifting burdens of child-rearing onto the state, or onto the schools, and supporting those activities through taxes or tuition, runs into this fact."  

Coleman’s last sentence is an important one to reconsider in the year 2000. One of the byproducts of the recent economic changes is the fact that almost everyone is working more hours. This includes parents of children. For example, “72 percent of women with children younger than 18 work outside the home, a five percent increase since 1992. And 61 percent of women with children younger than three work outside the home, up six percent for the same period.” The following table shows the average combined working hours of parents with children over a 30-year period.

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Average combined working hours of parents with children

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Children 6 to 17</th>
<th>Children 3 to 5</th>
<th>Children under 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combined Weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>56.3</td>
<td>59.6</td>
<td>52.3</td>
</tr>
<tr>
<td>1979</td>
<td>64.7</td>
<td>66.4</td>
<td>62.2</td>
</tr>
<tr>
<td>1989</td>
<td>68.7</td>
<td>70.5</td>
<td>66.7</td>
</tr>
<tr>
<td>1998</td>
<td>70.4</td>
<td>72.2</td>
<td>68.3</td>
</tr>
<tr>
<td></td>
<td>Combined Annual</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>2,739.8</td>
<td>2,906.5</td>
<td>2,537.4</td>
</tr>
<tr>
<td>1979</td>
<td>3,050.8</td>
<td>3164.2</td>
<td>2,884.9</td>
</tr>
<tr>
<td>1989</td>
<td>3,293.3</td>
<td>3,406.9</td>
<td>3,164.6</td>
</tr>
<tr>
<td>1997</td>
<td>3,442.7</td>
<td>3,545.0</td>
<td>3,316.5</td>
</tr>
</tbody>
</table>


What might these statistics mean for children’s learning? Consider the following data in light of the research from the 1997 Kellogg Corporation’s Learning Now program: the “conclusion was based on research conducted in Michigan, which compared the relative influence that family, community, and other factors have on student performance. Amazingly, it concluded that factors outside of the school are four times more important in determining a student’s success on standardized tests than are factors within the school.”52

Such a research finding would not come as a surprise to anyone who appreciates the fact that children are always learning. Their brain’s are always absorbing information and trying to make sense of it. The problem is that in today’s information saturated world much of what they learn is either worthless or even downright dangerous. There are two ways of handling this: 1) keep children in schools and daycare centers where it is easier to control what they learn for longer hours, or 2) reconnect children’s learning to the activities of the larger community by making

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communities safe and stimulating enough for their constant exploration. The 21st Century Learning Initiative is dedicated to helping create the conditions for the second option, and we remain optimistic even though we understand the second choice flies in the face of current economic trends.

If we want our children to become responsible life-long learners then we need to be as concerned about their time outside the classroom as we are about their time in it. If we want children to function well in an open and dynamic economy then it is imperative to expose them to open and dynamic learning environments. Harvard’s Robert Putnam has written and spoken extensively about the concept of social capital, and why it matters for children’s learning. What he told a recent gathering discussing the new economy at the White House is so important to children’s learning that I quote it here extensively:

“The basic idea of the concept of social capital is that networks have value. Everybody in this room knows that networks have value for transmitting information. They also have value as a basis, for undergirding cooperation and reciprocity. Reciprocity is a $10-word, but it was best defined by the baseball player Yogi Berra when he said, if you don’t go to somebody’s funeral, they won’t come to yours. And that kind of reciprocity is a key to all sorts of cooperation, and is undergirded by networks. It’s undergirded by networks in the economy. Any of the entrepreneurs in the new economy knows that companies, venture capitalists and employees who have better connections are better remunerated, and they are because their connections have value. What I’ve been doing in the last several years is studying the value of those social connections for communities.

And it’s quite clear that social capital is one of the most important assets that a community can have. I’m very impressed as an educator with the administration’s efforts to make investments to decrease class size. But the statistical evidence is that the best predictor of the performance of a community’s schools, the best predictor of math scores and science scores, for example, is the social capital in that community, even better than the class size. The best predictor of the crime rate -- negative predictor of the crime rate -- in a community is not how many police they have, or how much they're spending on cops,
but the amount of social capital in the community. And by that I simply mean the number of people who know one another's first name, the number of people who take part in community organizations, the level of trust and reciprocity in the community ...

Connectedness matters to our lives and to our community's health in very many measurable ways. That's the first point: social connections really matter in measurable ways. The second point, American communities have seriously lost many forms of social capital over the last 25 years. We're familiar, all of us in this room, with one index of this, which is the decline in voting turnout. That's down about 25 percent. It turns out that that is actually one of the least striking measures of the decline in social connectedness. And in my new book, *Bowling Alone*, I try to pull together a lot of evidence. I'm going to just highlight a very few facts for you.

The frequency with which families eat dinner together has declined by one-third over the last 25 years -- not just for people who work at the White House, for all Americans -- the frequency with which you have dinner with your family -- the frequency with which families take vacations together has declined by one-third over the last 20 years. The number of times you have friends over to the house has declined by 45 percent in the last 25 years. Participation in clubs, in civic organizations -- not just the old-fashioned ones with the funny hats, but even the new-age poetry groups and so on -- adding all of those civic, community organizations up, involvement in those has been cut more than in half in the last 25 years.

Church attendance is down, net, by about a third since the 1960s. Philanthropy in absolute dollars is up, but of course everything's up in absolute dollars. As a fraction of income, philanthropy is down by nearly one-third since the 1960s.

So in many respects, communities all over the United States have seen a serious erosion of this very valuable asset, our social networks that connect us with one another. Finally, my last point, the historical challenge. We as Americans have been here before. There are deep parallels -- and Mr. President, you've made this point lots of times in your presidency, and
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I think it's a very valuable insight -- there are deep parallels between the turn of the 20th century and the turn of the 21st century.

Deep parallels -- not least the features of growing inequality in both of those two periods. But one of the important features is -- one of the important similarities between the end of the 19th century and the end of the 20th century is that in both cases a variety of technological and economic and social changes rendered obsolete one stock of social capital. In our lifetimes, it's a variety of trends. It's partly technological change, it's partly two-career families, it's partly sprawl and suburbanization -- a variety of factors meant that we no longer feel comfortable going to the PTA or the Elks' Club or the League of Women Voters.

In the previous period, the end of the 19th century, immigration and urbanization and industrialization meant that people no longer lived near people that they had connected with. So when they moved from the farms in Iowa to Chicago, they left their friends behind in the farms. Or when they moved from the shtetl to the Lower East Side, they left their community institutions behind at the shtetl. And America, at the end of the 19th century, just as we do, suffered from all of the same symptoms of a social capital deficit. And then they fixed it.

In a very short period of time, at the end of the 19th century, roughly between 1890 and 1910, most of the major civic institutions in American life today were invented. The Red Cross and the Boy Scouts and the League of Women Voters and the NAACP and the Urban League and the Knights of Columbus -- and Kiwanis and Rotary and most unions and most professional organizations, and on and on. It was an extraordinary period of civic inventiveness. And their debates about the effects of technology on their communities were amazingly parallel to the debates we are having now...

I'm saying, we need to reinvent the Boy Scouts or the Red Cross, or the League of Women Voters or the NAACP. I'm not talking about those organizations. Don't misunderstand me. This time around, maybe it won't be organizations. This time around, it may require -- and
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this is the challenge that I'm issuing to all of us in this room -- it will certainly require powerful, creative impetuses from the world of the new economy."\(^{53}\)

In conclusion Putnam noted, "Across time, across space, across the American states, there's a very strong, positive relationship between the degree of economic equality and the degree of social capital. The places in America that have the lowest disparity of income are the places that have the highest levels of civic engagement." It takes time to develop networks, to build organizations, and to raise children. Yet, from the perspective of children's learning nothing could provide greater rewards than a cross-section of citizens coming together around the developmental needs of all its children. Parents understand this intuitively, and many want to be involved in organizations that their children are interested in joining. In fact much of the angst that parents say they feel is directly related to juggling their need to work and their desire to spend time with their kids. "Increasingly its mandatory overtime versus coaching my kid’s Little League baseball team," many parents now lament.

This tension was noted recently by a reporter for the Washington Post who wrote, "facing a tight labor market and the intense competitive pressure of the round-the-clock economy, it's no surprise that companies are trying to squeeze as much as they can from their employees. What's new is that workers, including the ever-growing number of women on the job, are beginning to balk."\(^{54}\) Some American workers, including telecommunications workers, nurses and airline pilots, have even gone on strike recently to lower the hours of overtime they work, because they simply want to spend more time with their families and in their communities.

**REACTING TO THE TIME BIND**

Despite the fact that the average family with children worked 14.5 hours more a week in 1998 than in 1974 most parents want their children, especially their very young children, to be raised by one or the other of them. The author of this paper is not suggesting that women return to the kitchen. In fact, my wife and I are dealing with these very issues as we both juggle work we value and the needs of our very young daughter. We both have learned that partnerships begin at home.
According to the New York-based Public Agenda, “At the most basic level, parents of young children believe that having a full-time parental presence at home is what’s best for very young children, and it is what most would prefer for their own family. The recurring, powerful refrain from the focus groups and survey findings is that whenever possible, nothing beats having a mother or father at home. Asked to choose among six child care situations that might be appropriate for children during their earliest years, 7 in 10 (70%) parents say the best is to have one parent stay at home. Most parents with young children (68%) ‘would prefer to stay home with children when they are young,’ with mothers (80%) far more likely than fathers (52%) to say this... Two out of three (66%) strongly agree that ‘if a family can afford it, it’s almost always best for the kids to have a parent at home full-time. More than half (56%) strongly agree that ‘no one can do as good a job of raising children as their own parents.’ By an overwhelming margin (81% to 1%), today’s parents say that children who spend the day with a stay-at-home parent are more likely to get affection and attention than those who are in quality child care.”

“Over the last two decades, American fathers’ time at work has increased by 3.1 hour per week...for mothers, it’s 5.2 hours. Employed fathers with children younger than 18 now work an average of 50.9 hours per week; working mothers 41.4 hours.” Despite what most parents actually want, their increased working hours means their children are spending more time in the care of professionals. Does increasing children’s time in structured settings influence children’s learning? According to many experts it is not necessarily a bad thing. “The evidence is fairly compelling now that the mere fact of having working parents doesn’t create problems for children.” So says Andrew Cherlin, a sociologist at Johns Hopkins University, who continues, “We’re clearly putting more structure in kid’s lives, but there is not much evidence that it is hurting them.”

The evidence is questionable. Remember that learning is an intensely subjective, personal process that each child constantly and actively modifies in light of new experiences. The more varied a person’s experience the more perspectives that person can bring to a new opportunity or problem. This is an important point from the perspective of learning. The basic action of the human brain is to link one event to another. “We make sense of present experience by comparing it to previous ones; once we have found a match, we use our previous experience to decide what

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to do next, to predict what will follow, or simply to characterize it as another instance of something which we are familiar. What this means is that we can really only understand—and, hence, remember—situations we have been in before. Our memories are really little more than the sum of stories we can recall and apply. Part of knowing the right story to tell is having a lot of them.”59

Economically, nations gain in the short-term by getting parents into the workforce as soon as possible after the birth of their children. Both working parents and the professionals who watch children add to the gross domestic product and they pay taxes. However, it has to be stressed that as children spend more time in structured learning environments they, not surprisingly, become successful in navigating and excelling in such closed environments. They quickly learn the rules to success, and as long as the rules don’t change they do well. They feel comfortable in settings where things are structured and controlled. In contrast, a more open and risky environment intimidates them; they have learned to play life safe. If this is indeed the case, then we are creating a potentially dangerous disconnect between the learning environments we are providing for children and the economy we are creating for them to enter into as adults.

Two researchers for the Board of Governors of the U.S. Federal Reserve System captured the significance of this disconnect when they wrote for the governors in 1997: "By identifying alternative means of accumulating human capital, we are able to show that an economy in the early stages of development may have too little education, but in later stages of development may have too much education ... When entrepreneurial human capital is more important than professional human capital in determining the level of technology, the steady state will have too many professionals and too few entrepreneurs. Thus, a reduction in direct formal education and an increase in entrepreneurial experience (activities in partnership with organizations outside the school) could increase per capita income."60 Read this again: it says that a reduction in direct formal education and an increase in entrepreneurial experience could increase per capita income.

What this means is that in a developed country which has plenty of professionals such as lawyers and doctors there is a greater need for a high number of entrepreneurs (those people behind the new economy) to sustain or expand economic productivity. Young people who have multiple
opportunities to flex their intellect beyond just the relatively closed environment of the classroom are more likely to become such entrepreneurs. In other words, for young people to thrive in highly flexible, changing environments, they need to have grown up in open and challenging environments that stimulate their ability to be creative and thoughtful. It is rare for such challenging learning environments to coexist within institutions driven by a time-clock or a mass of standard operating procedures. Complexity theory summarizes this nicely, "If the dynamics of the system are too chaotic, no learning occurs because there is not enough stability to conserve information; if the dynamics are too static, no learning occurs because no change occurs in response to new information."  

Not surprisingly, these more open learning environments are very similar to the same sorts of environments where adults thrive as well. Arie P De Geus of the Shell Corporation has written that a company that seeks short-term gains at all costs encourages lower employee loyalty and "reduced levels of trust, which then require a management style based on stronger hierarchical controls. Stronger controls reduce the space for innovation and lead to lower learning abilities of the company as a whole. Lower levels of learning in the post-industrial society reduce a company's life expectancy in a world in which success depends on the ability to maximize the use of the available brain capacity."

CONCLUSION

This article will conclude by asking you the reader if you feel that children are becoming alarmingly deficient in generating their own ideas and opportunities? If you feel that indeed they are, then you should seriously consider what can be done to develop new models of learning that would help all children take responsibility for their own learning. Believe it or not humans are in fact predisposed to think for themselves, and we are very good at it when given the proper upbringing. If this were not indeed the case we would have disappeared long ago as a species. There is a very optimistic scenario waiting to unfold and that is one where the needs of the economy are actually in-line with the natural functioning of the human brain. Yet, for this too happen, we must be careful to balance the many opportunities of today with the learning needs of our children. There is a real danger that we may be missing the opportunity. We may, in fact, be
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creating an economy with endless possibilities, while at the same time creating very few young people who will actually be able to take advantage of them.

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ENDNOTES:

3 Ibid.
5 Ibid.
6 Ibid.
12 Gordon Brown.
15 According to the OECD "In recent years, the US economy has grown at a surprisingly fast pace, in a phase of expansion that started nine years ago and constitutes the longest-ever recorded period of sustained growth. Moreover, expansion has been marked by low unemployment and record employment but also by low inflation, and an acceleration of productivity growth in the most recent years. This long period of expansion coincides with significant investment in and the diffusion of information and communication technologies (ICT) and their applications. The term 'new economy' has been coined to mark the association of inflation-free growth with computerization and globalization, with the implication that information technologies play a major role in explaining sustained growth. The notion of the 'new economy' has also been employed to signal that the workings of the
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economy may have significantly changed, with rules, principles and institutions different from those of the 'old economy.' A frequently cited example of such new factors is the rising importance of network externalities. Whether a 'new economy' in this sense has actually emerged is unclear but the performance of the US economy is uncontested and has been contrasted with growth and employment in many European countries and in Japan." Paul Schreyer, "The Contribution of Information and Communication Technology to Output Growth: A Study of the G7 Countries." (Paris: OECD) 2000.
20 Robert Kanigel, p. 19.
22 Robert Kanigel, p. 18.
26 David Labaree, p. 114.
37 Robert Gilpin, p. 6.
39 An issue of demographics: Peter Drucker captured the significance of an aging population when he wrote for the Harvard Business Review, "The developed world is in the process of committing collective suicide. Its citizens are not having enough babies to reproduce themselves...For the next 25 years the underpopulation of the developed countries is an accomplished fact and has the following implication...Economic growth can no longer come either from putting more people to work - that is, from more resource input, as much of it has come in the past - or from an increase in consumers' demands. It can come only from a very sharp and continuing increase in the productivity of the one resource in which the developed countries still have a competitive edge (and which they are likely to maintain for a few more decades): knowledge work and knowledge workers." Peter F. Drucker. "The Future That Has Already Happened," Harvard Business Review. (September/October 1997), p. 20. What this shift towards an

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aging society has meant in the United States is that an increasing proportion of government spending has gone towards the needs of the elderly at the expense of children. Currently the federal government spends seven times as much per person on the elderly as it does on its young. In fact, "government spending on the elderly by itself now gives people over the age of 67 per capita incomes of equal to 60 percent of the American average...the elderly make up about 13 percent of the population, but they receive, excluding interest on the national debt, half the federal budget." Lester Thurow, *The Future of Capitalism*. (New York: William Morrow and Company), 1996, p. 104.


43 Other factors that tend to exacerbate differences in household incomes is increases are divorces and separations, increases in births out of wedlock, the increasing age of first marriage, and the increasing length of schooling.


46 Ibid.


49 It was recently reported in *The Washington Post* that, "So far, schools in prosperous suburban districts have advanced the most in tapping the educational potential of the Internet. Those schools are better able to bear the costs of training teachers as well as purchasing computers and wiring classrooms." Kenneth J. Cooper. "Internet at School is Changing Work of Students - and Teachers." *The Washington Post*. (September 5, 2000), p. A2.


51 Alexis M. Herman, Secretary of Labor.


57 A note about daycare providers: The term "daycare" itself encompasses many arrangements. There are some arrangements that are highly innovative and from the perspective of children's learning and the needs of the parents worth studying. One example is a daycare cooperative where parents take turns caring for others' children on a reciprocal basis. Four or five families may work together to provide support one another's children. However, increasingly parents utilize the professional daycare centers where activities are more formalized and controlled and the workers are poorly paid ($6.89 an hour in the US).


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Component Three

The Community as the Web of Learning

Please read the following papers through carefully. During the day on 19th June we will discuss several of the issues set out in papers 9 and 10 and 18 and 19. A further, short, paper on *Social Capitalism and the Family* is currently being prepared. This will be available in June. In the meantime please do read the fascination article from the New Zealand Herald at the end of this booklet.