

THE FUTURE OF EDUCATION AND EDUCATING FOR THE FUTURE

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INTRODUCTION:

If we are going to provide education that prepares students for the 21st century work world, the first thing we have to do is understand what the 21st century work world will look like. To do this I suggest that we first look at the workforce that your children will be competing with for meaningful work. The second critical perspective is to try and understand the kind of work environments that your children will be working in.

To do this, I suggest that we look at two books. The first is Tom Friedman's book, "**The World is Flat**", a book that looks at the enormous influx of highly competent "knowledge" workers from the developing world (China, India, and many other countries in Asia, Central Europe, etc.) who will be competing for jobs in a "wired" world. The second book, "**The Singularity is Near**", by Ray Kurzweil, describes the coming cataclysmic changes to society, work, medicine, and economics that will result from the exponential growth of knowledge in the fields of artificial intelligence, biology, neuroanatomy, and computer technology.¹

Given that many schools still use technology developed in the 19th and early 20th centuries, and use textbooks that are 3-5 years behind the state of current knowledge in the fields of science, there is a need to rethink how we, as educators, can redesign our schools to meet the highly competitive, rapidly changing work world that our students will face. Let us look, then, at the implications of the "flattening" of the work world and the exponential growth of knowledge for education. Then let us look at the current state of thinking regarding education for the 21st century. Finally, let me recommend some changes that education needs to make if we are going to adequately prepare students for the fundamentally different world that they will work in.

IMPLICATIONS OF THE FRIEDMAN/KURZWEIL ANALYSIS FOR THE FUTURE OF EDUCATION:

Simply stated, Tom Friedman's main thesis in his book, "**The World is Flat**" is that the "wiring" of the world with high speed fiber optic cable has occurred at just the time when computers have become cheap enough that workers from all over the world will be able to compete in the knowledge work which has become the primary "work" of the 21st century.

Developed countries like the USA and states in the European Union will no longer be able to dominate "knowledge" work. Even as we have seen manufacturing jobs "migrate" to low wage countries, Mr. Friedman argues that we will see the high wage "knowledge work" migrate to wherever businesses can get the best work done at the

cheapest price. He points to India, now providing much of the “back room” services for many service industries in the developed world, as a good example of what is happening and what is to come. Now, he continues to argue, major computer companies are putting their research and development laboratories in countries such as China and India, where they have access to highly trained specialists who will work for much less than similar workers in the “developed” world.

Because parents of children in these “developing” countries are hungry for the success of their children, there is a strong emphasis on education; they produce students who are highly skilled in large quantities. Let me give you one example to make the point. China graduates more students in the top 10% of their classes than there are students graduating in the United States. Can you imagine the impact of these highly trained, highly motivated graduates from India, China, Central Asia, and elsewhere when they hit the job market?

What are the implications for educating students for such a competitive future in the knowledge workforce? They are, I believe, several. But before we examine the implication of the very competitive labor market in the 21st century, let’s look at the enormous changes that are going to occur in all the major fields of study that will impact our world, our countries, and our labor markets.

IMPLICATIONS OF THE EXPONENTIAL GROWTH OF KNOWLEDGE IN THE 21ST CENTURY.

The best way for you to understand the tsunami of changes that are going to occur in every sector of our world is to read Ray Kurzweil’s book, “**The Singularity is Near**”. Let me share with you some of his predictions based on his lifelong study of the issues that he discusses in his book.

“Over the last 20 years, I have come to appreciate an important meta-idea: that the power of ideas to transform the world is itself accelerating...During the 1990’s, I gathered empirical data on the apparent acceleration of all information-related technologies and sought to refine the mathematical models underlying these observations. I developed a theory I call *the law of accelerating returns*, which explains why technology and evolutionary processes in general progress in an exponential fashion.”ⁱⁱ

Gradually, I’ve become aware of a transforming event looming in the first half of the 21st century. Just as a black hole in space dramatically alters the patterns of matter and energy accelerating toward its event horizon, this impending Singularity in our future is increasingly transforming every institution and aspect of human life...What then is the Singularity? It is a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed. (p.7)

...Within several decades information-based technologies will encompass all human knowledge and proficiency, ultimately including the pattern-recognition powers, problem-solving skills, and emotional and moral intelligence of the human brain itself. (p.8)

- -The Singularity will allow us to transcend the limitations of our biological bodies and brains. (p.9)
- -Our technology will match and then vastly exceed the refinement and suppleness of what we regard as the best of human traits (p.9)
- -...the future will be far more surprising than most people realize, because few observers have truly internalized the fact that the rate of change itself is accelerating. (p.11)
- -At the rate of progress in 2000, the achievements of the entire 20th century would occur in 20 years. We'll make another "century" of progress after that in 14 years, then do the same thing again in 7 years. To express this another way, we won't experience one hundred years of technological advance in the 21st century, we will witness on the order of 20,000 years of progress (again, measured by today's rate of progress) or about 1,000 times greater than what was achieved in the 20th century. (p. 11)
- -The Singularity will allow us to overcome age-old human problems and vastly amplify human creativity. We will preserve and enhance the intelligence that evolution has bestowed on us while overcoming the profound limitations of biological evolution. (p21)
- -The rate of technological innovation (paradigm shift) is accelerating, right now doubling every decade. The power (price-performance, speed, capacity, and bandwidth) of information technologies is growing exponentially at an even faster pace, now doubling every year. This principle applies to a wide range of measure, including the amount of human knowledge. (p. 25)

I could go on and on (the book is 652 pages full of these amazing deductions from extrapolating current trends in the exponential growth of information, computing, and knowledge in all fields of human endeavor. One recent example of the impact of our growing ability to speed up the process of discovery is the rapidly improving capacity in the sequencing of the SARS virus, which took only 31 days from the identification of the virus, compared to more than 15 years for the HIV virus. (p.74)

Let me suggest that you read the book. It is a critically important book if you want to understand what your children will be facing when they enter the work force in the period from 2020 to 2030!

CURRENT THINKING ON EDUCATION FOR THE 21ST CENTURY:

Current thinking about education in the 21st century does anticipate the enormously competitive environment that children that are now being educated will face in the next 10-20 years. But most schools are part of larger educational systems that are slow to change. In a book recently written about the challenges the educational system faces in the United Statesⁱⁱⁱ "This is a world in which a very high level of preparation in reading, writing, speaking, mathematics, science, literature, history and the arts will be an indispensable foundation for everything that comes after for most members of the workforce. It is a world in which comfort with ideas and abstractions is a passport to a

good job, in which creativity and innovation are the key to a good life, in which high levels of education—a very different kind of education than most of us have had—are going to be the only security there is...Strong skills in English, mathematics, technology, and science, as well as literature, history, and the arts will be essential for many; beyond this, candidates will have to be comfortable with ideas and abstractions, good at both analysis and synthesis, creative and innovative, self-disciplined and well organized, able to learn quickly and work well as a member of a team and have the flexibility to adapt quickly to frequent changes in the labor market as the shifts in the economy become every faster and more dramatic. ***If we continue on our current course, and the number of nations outpacing us in the education race continues to grow at its current rate, the American standard of living will steadily fall relative to those nations, rich and poor, that are doing a better job.***^{iv}

In England, the current government, lead by Prime Minister Brown of the Labor Party, is calling for a total overhaul of their education system. There are very few countries that

behind current knowledge in most fields. Clearly schools need to be able to access information on a timely basis by staying abreast of developments in specific fields through the use of the internet and interest groups, both in education and in the specific area of technology or information that is being developed;

2. ***Teachers and schools must be totally committed to continuous learning on that focuses on the technological changes*** (that is now doubling every year) ***and knowledge growth*** (that is now doubling every 10 years). This will require that schools make continuous learning a central component of their educational system and use financial incentives to reinforce teachers who continuously advance their knowledge in their chosen field;
3. ***School administrators and parents, working together, must become committed to insuring that schools have a plan to continuously train its staff to stay abreast of all the changes that occur in every field every year.*** It has been empirically demonstrated that the best predictor of student success is active parental involvement in the child's education. This level of commitment, however, will now have to be greatly increased as parents will also have to stay current in the many changes that are impacting the world and impacting the world of education;
4. ***Significant funds must be set aside (15-20%) in each school's yearly budget for training. Further, additional funds (10-15%) of each school's yearly budget needs to be set aside to continuously update the technology (hardware and software)*** so that teachers and students are able to learn on the newest technology available.

CONCLUSION:

Many schools will not have the freedom or the fortitude to make the commitments necessary to prepare their students for competitive knowledge work in the 21st century. Many teachers will not make the commitment to do the hard work necessary to stay abreast of the rapid changes in information and technology necessary to best prepare their students for the coming "singularity". Many parents will not take the time to keep abreast of the rapidly changing world of technology and the exponential growth of information so that they can help prepare their child/children for success in the 21st century world. Many students will not make the total commitment that is necessary to build the skills that they will need for successful 21st century knowledge work.

But some schools will make the necessary commitments. Some teachers will do the hard work that is required. Some parents will commit themselves to staying abreast of the rapid changes in society, technology, and knowledge. And some students will make the effort to get the broad range of skills necessary to become the leaders in the 21st century.

I would encourage school administrations and teacher groups to begin working with parents and parent organizations, with students and student organizations so that your school, your teacher, your parent, and your student have a chance to be part of the greatest change the world has ever seen since creation itself!

I would encourage parents to find the schools that are making these commitments and work with them to develop educational systems that will prepare their children for knowledge work in the hyper-competitive, constantly changing environments they will be living in as they join the work force!

ⁱ Bill Gates, in commenting on the book by Ray Kurzweil, says, “Ray Kurzweil is the best person I know at predicting the future of artificial intelligence. His intriguing new book envisions a future in which information technologies have advanced so far and fast that they enable humanity to transcend biological limitations—transforming our lives in ways we can’t yet imagine.” As cited in the “Comments” section of Mr. Kurzweil’s book, “**The Singularity is Near**”

ⁱⁱ Ray Kurzweil, “**The Singularity is Near**”, p. 3.

ⁱⁱⁱ **Tough Choices or Tough Times**, National Center on Education and the Economy,

^{iv} Tough Choices or Tough Times, pp. XIII-XIX

^v This paper is written from the perspective of an independent, international school. Schools that are part of larger school systems controlled by various government or quasi-government agencies will have to address the many additional issues that constrain their ability to rapidly respond to the changing world and work environments that are being created as we move deeper into the 21st century.