HUMAN COMPETENCE

EDWARD F. BERGER

HUMAN COMPETENCE

By Edward F. Berger, Ed.D. (a.k.a. C. Descry)
Free e-books available at MillennialBooks.com

Vital Lies: Analysis and Solutions to Critical Issues Facing Our Education System. 2nd Edition;
Book of Blogs;
The Early Years: Crow Canyon Education and Archaeological Research Center;
Crow Canyon: Pioneering Education and Archaeology on the Southwestern Colorado Frontier. 2nd edition;
Transcending: The Life of a Twentieth Century Man;
Unscrewed: The Education of Annie;
Cut Off: When Illusions Survive;
The Spirit of the Sycamore;
The Spirits in the Ruins;
The Spirit of the Estuary;
The Daughters of Onoto;
The Brothers Shikoku;
The Fallout Solution;
Raven's Chance;

HUMAN COMPETENCE

EDUCATING FOR THEIR FUTURE

EDWARD F. BERGER

Contact Information:
Dr. Edward F. Berger

cdescry@cableone.net
www.edwardfberger.com
Podcasts with Dan Kenley:
insightsintoeducation.libsyn.com

Jacket art by Karolina Stankevičiūtė

Song Lyrics:
"Around Here"
© 2018 Eric Ramsey and Eric Ramsey Music
"Meditation on the Trees" © 2018 Jo Berger
"Deep Yellow Moon" © 1993 Jo Berger
"Open Up Your Heart" © 2017 Jo Berger,
"Under the Milky Way" © 2018 Jo Berger
Performances available on YouTube

ISBN: 978-1-0722-1435-9

To the young who will brave a future as challenging as mankind has ever known.

CONTENTS

ABOUT THIS BOOK

This book is written for those who will live beyond tomorrow in an unknown future. Technology, and specifically artificial intelligence (AI), is advancing at a rate that is unparalleled in human history. Human beings are capable of great accomplishments, beautiful expressions of creativity, and horrific acts of brutality. If humanity is to survive, we need to evolve.

Today's educators, and students, are locked into education systems designed for a past that no longer exists. As artificial intelligence outpaces the computational skill of the human brain (biological intelligence), and data is now readily available in this technological age, we must identify the unique human strengths that will guarantee the survival of our species.

I like to think in terms of bubbles in time that encapsulate our lives. We build nests for security and when we are gone, our accumulated possessions are dispersed. What we leave behind, if anything, is genetic material—if we have children—

and the remnants of our accomplishments if they are significant enough to be useful in a future time. Some people dream of a future for mankind that exists beyond their personal bubble. Most hope that they have provided a foundation for their descendants and for all who will live in future societies.

I have spent most of my adult life teaching; trying to make education relevant, dynamic, and individualized to meet the needs of every learner. I believe in empowering students to become self-directed learners. They need to have a reliable skill set that allows them to follow their passions, think critically, learn at an accelerated pace, adapt to changing situations, work collaboratively, and hold to the highest standards attainable as ethical human beings. I want to do what I can to prepare our kids, so they can 'live long and prosper' in their time.

Juval Noah Harari is a present-day historian and philosopher. Much of what I understand about our species, the future of mankind, and how best to prepare those who will live in the future, comes from Harari. There are other leaders with powerful insights as well. Once, in a time past, I envisioned tomorrow and went with my insights and dreams. I shared much, wrote many words, lived and taught by example. I was joined by others who had similar

insights. The information my wife and I gained about accelerating learning, through building Crow Canyon, an education and archaeological research center, was powerful. Now, with almost sixty years of experience as an educator, I continue to write about how we have to restructure education to better prepare students with skills for their future—a future which is not entirely unpredictable.

My most effective teaching was around campfires. With the help of my wife Jo, who brought music, poetry, and insights to cement experiences, we wove reality and history into stories that could be retold as a foundation for the times ahead.

The gathering of students—the class and dialog—described in this book exemplifies a model classroom for the future. I set the parameters for the students and gently guide their search for answers. As the class progresses, I begin to withdraw and become part of the team. The students take power, use their skills, explore new ideas, reflect on their own experiences, and apply their insights to the design of an improved education system for the future. This search for answers takes place through a medley of student dialogues.

Welcome to the fire.

PREFACE

Is it possible that our strongest human qualities could end our species? In just a few campfires we will move from a group of isolated individuals to a relatively cohesive group bound together by our shared thoughts and experiences. I imagine that our earliest ancestors did the same type of thing around campfires. They worked together to survive; to tell their history, sing, and celebrate the richness of life. Those abilities to interact, to be resourceful, and go ever forward, the abilities we will rediscover here, are what made sapiens survivors.

Now, artificial intelligence may see those as our greatest weaknesses. Computers don't need skills to interact with others—they network through data sharing—but that is different than collective human intelligence. How can we modify our schools to teach the skills students need to adapt and flourish in this new age of artificial intelligence? We want humans controlling AI, not the other way around.

HUMAN COMPETENCE

Chapter I

We evolved as individuals, but we only survive if we work together.

Gather around everyone. Get comfortable. The campfire is just now getting a good bed of coals and the flickering light is reaching up into the leaves on the cottonwood trees. The sky is glorious. As the fire dies down, you can see the green and golden colors of the Milky Way. Tonight, we are sharing experiences that humans like us have shared since our kind began. Listen to the sound of Jo's flute as it is carried on the summer breezes. Let it run its vibrations up and down our spines as we think about who we humans really are.

Reach down and imagine that a handful of earth is stardust. We are part of what is old in this Universe and yet, we are only a recent combination of these elements. We exist in a process of evolution and this is our time, or so we tell each other. What

we are and how we perceive the world around us is interpreted through our five senses—at least the five we know about. We are at a stage in our development where we, as a species, have multiplied and increased in numbers so vast that we now threaten almost all other living things on this planet. We are so arrogant that we are immune to the futility and grief of starving members of our human family and the terrible fear and suffering emanating from slaughter houses that kill animals to satiate our hunger.

Our story is a long one because our species has learned to adapt to change. It was only 70,000 years ago that our ancestors' brains developed enough to begin a *cognitive revolution*; the ability to use a process of knowing, perceiving, thinking, understanding, and learning. Our ancestors honed their 'modern' brains during almost 55,000 years as hunters and gatherers.

We entered the *agricultural revolution* about 10,000 years ago, when caring for plants caused us to stay in one place. Our ancestors stopped roaming and farmed; they began to build villages and to seriously differentiate labor. The *agricultural revolution* continued. Cognitive development was re-directed as man changed from a species of nomadic hunter-gatherers to farmers. Becoming

agriculturalists required a different kind of intelligence. That change was responsible for major increases in population, which soon resulted in trade networks and territorial conflicts between groups with their own lifestyles and superstitions.

About 5,000 years ago the invention of writing and money began to influence and shift the brains of our ancestors. The societies they designed brought the age of cities and kingdoms with political and commercial links that began to reveal the possibility of a single network that would eventually encompass the entire globe.

By the fourteenth century, European explorers, conquerors, and traders had encompassed the planet. This global extension of our collective experiences is still expanding, and we, the living relatives of those who have gone before, are attempting to understand our role in this Universe and on this planet in the twenty-first century. Will we continue the evolution of economic and political systems to enhance the lives of all humans? Will we go into space and conquer other worlds? Will the technology and artificial intelligence systems we develop, these computer-based pattern recognition advancements, surpass us and create systems that enslave us? Could our inventiveness bring our species to the brink of extinction?

Each of us seated here around the fire is ultimately alone. That is not an accident. Human beings evolved that way. In each of our minds we find our magic compass; we see ourselves as the center of the Universe following our life's direction. We are unique individuals, but we have learned that to survive we must work together as a collective group.

Don't make a sudden move! Look over there across the meadow. There is a doe standing in the tall meadow grass. She blends in so well in the starlight. She must know we are here, but she is not afraid. I'm wondering, does she have a compass like yours? Is she the center of her world? Is she an individual? Does her survival depend on the ability of the herd to work together?

Do we protect her life because we see her as unique? Not really. Most people assume that an animal like that beautiful doe is a carbon copy of all deer; they are interchangeable. Kill one, and there is another just like her to take her place. As the dominant species, we have the power to decide if she lives or dies.

Is an individual human being expendable? There are a lot of us after all. Are you really so different from that doe? You are one of many essentially similar people in the herd of humanity. Is

your individuality something that must be respected and protected?

In the last few centuries, those who came before us have devised and relied upon government systems to protect and preserve the right of each individual to live and prosper. Through our Constitution, we accept these rights as a fundamental part of our existence. But what guarantee do we have that these rights will continue in the future? Perhaps the efficiency of systems based on artificial intelligence will determine there are way too many of us 'individuals' and the herd should be culled.

Not long before you became a force in the world, a man named Hitler and others who thought like him rose to power. By the time they were through, over eighty million individual human beings were dead. Previously, the European conquest of the Americas killed over one hundred million people. How have those losses affected your life? Is there any day that goes by that you mourn any one of them? Other monsters and diseases have killed millions of people in many parts of the world. Has civilization been set back due to their loss? If the answer is, "No" or "I don't know", then you may think of them as expendable. The species survives and individuals are easily replaced without consequence.

Heads are hanging low; the embers glow. But maybe, just maybe, staring into the coals you see that the future of individuals in our species depends on what we do to determine if life, liberty, and the pursuit of happiness are really the inalienable rights of human beings. Have we evolved (or are we evolving) into beings that are not only individual parts of a whole, but also entities of a new force; not simply cogs in a new machine?

What happens when a machine can do our tasks faster and more accurately? As we continue to rely on computer-based systems using artificial intelligence, will there be a reason for human beings to exist? At what point do those in power, whether human or a data-driven algorithm, decide that the rights of individuals aren't important. If they decide that individuals don't matter, what happens to you? What do you think?

"Doctor Berger, what do you mean by 'data-driven algorithms'? We study algorithms in math class, but . . . I mean?"

Mary, think about it this way. Algorithms are the analysis of data by sophisticated computer programs that look for and expose patterns. These pattern recognition programs can look at your

buying record and determine what you like—what colors, what materials, what books. They track your preferences and generate data. As these programs advance and collect more data, everything you do, believe, and think is used to create predictable models that know more about you than you know about yourself. Now imagine how these computer-based algorithms will empower artificial intelligence to control and shape our everyday lives. They will influence how people vote, buy, respond, and even love. What if the data gathered through AI shows that humans are a crude, unreliable, and unnecessary species? Over-population is already causing all kinds of inefficiencies on the planet. Remember the film *Soylent Green* where humans, like deer, become a source of food? Follow me? We'll be talking about these kinds of ethical and systemic issues that affect your future.

"Geez, that's creepy! I'm almost sorry I asked."

"Hey Doc. I know better than to give out that kind of information. You just have to be careful. I don't think that affects me."

I wish that were true. Do you watch Netflix? I know you have an iPhone. Do you order stuff

online? Do you subscribe to magazines? Do you pay by credit card when you go to movies or eat out? Do you belong to a church group? What classes are you signed up for this semester? What grades did you get in math in middle school? Do you have medical records? Ben, each time you touch a keyboard or engage in any activities, data is generated about you that is used to create a profile. Ever wonder why when you search for Nike products on the internet you start to get ads for all types of athletic shoes? Every day, in almost every way, we are being recorded and decisions are being made about us from the data collected.

Why the grimace Ben?

"He knows when you are sleeping. He knows when you're awake. He knows if you are bad or good, so be good for . . . Just exactly who is watching? There is no Santa, and I think I understand that God doesn't watch me everywhere. But what are you saying?"

In the very near future people who control the algorithms or the computer-generated forces that take control, will be able to drive us like self-driving cars and trucks. These forces controlling AI will be able to decide if we humans as parts of a

whole, have any use. Analysis of data can be used to decide if our species is not necessary at all, or if it needs to be managed like deer on a mountain reserve or in a zoo.

Right now, there are layers of data being gathered about each of us. Some is superficial data like the types of shoes you prefer. Then there are deeper layers like your tax information, bank statements, and school records. Layers below those deal with what you think of as private information—your personal preferences, what you 'like' on Facebook, your sex life, your medical conditions, your family problems, and more. It is shocking to imagine how deep data collectors can dig.

This is a lot to think about. I'm turning in. You may want to stay around the fire and talk more about these concepts. We'll meet tomorrow night.

Chapter 2

What difference can we make? What can we do about it?

Looks like we're all here. Did your day go well? Let's continue our discussion from last night's campfire. What are your thoughts?

"Okay. Why should we believe you? I mean I believe you, I guess, but . . . look, you are on your way out . . . Sorry, that sounded cruel. But you are eighty years old so why should you care about the future—you won't be around. It's just that, well Doc, a bunch of us were talking . . . I mean last night after you left the campfire. You scared us. I mean, those things you talked about were awfully grim. The problem is, we know parts of it are true. We know there really is a thing called artificial intelligence. We know they really are collecting

data about our shopping habits and our life choices, probably a lot more than we think. But we're just a small group of people, what can we do about it? We can't make a difference, so we should just deal with what comes, as it comes.''

Annie, you may have more power than you think. It is like the anthropologist Margaret Mead once said, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has."

There is a school of thought that our species has reached its end; that we have developed beyond our capacity to survive as evolving animals and have created the next stage of presence, which does not need us to participate in whatever it will be. Is it possible the *age of man* is ending; that sapiens will no longer have a place? Mankind has perceived the world as an arena of domination and exploitation. After all, we have wiped out thousands of species. Now, it might be our turn to succumb to a stronger external power and move toward extinction.

Maybe there has never really been an *age of the individual*, that the notion of mankind's importance is false. Individualism may simply be an

offshoot of wishful thinking; a rationale that makes us feel special as we move through our lives. Perhaps it allows us to use the natural world as we desire, to create our own reality, and create gods in our own image.

"So, if you believe it is over—that this age of man is ending—then why fight it? Don't all old people think the World is ending because they are? I don't get it . . ."

I think we have a chance to prove that the individual is unique and that human beings can function at levels way beyond the data-driven constructs of artificial intelligence. I believe that there are many levels of human development; and there are multiple intelligences. At the lowest level, data-driven information can be used to bypass individual intelligence and judgement, but I think we can visualize possibilities for humankind that dwarf the accomplishments of artificial intelligence.

Let's reach through virtual space and get information we need via the internet. Use your tablet or phone to Google: Jaan Tallinn artificial intelligence. Scroll down to Jaan Tallinn on Wikipedia. Read about this amazing man and establish

his credibility in your mind. Scroll through to: Machine Intelligence Research Institute and, if you wish, learn about Elezer Yudkowsky and his work. These sites will lead you to myriads of great sources of information about AI. Check out the Winter 2018 issue of Popular Science magazine. There's an interview by Mara Hvistemdahl with Tallin. I think Tallin had it right when he said, "Preparing for the event of general AI surpassing human intelligence is one of the top tasks for humanity."

For me, there is nothing more important than preparing our children to successfully thrive and contribute in the world as it evolves. I don't think our education system is doing that effectively. I think our education system needs to be enhanced to take on that task. That is the focus of these campfire discussions.

"Doc, you told Ben last night that they already have data about each of us. If that's true, we're already screwed."

No question about it, Steve. But what if we can use AI instead of letting AI use us?

"Really? How? As I see it, I only think I'm an individual, but with all that data about

me they can lead me around like they have a hook in my head. You said it yourself, if I'm not here, it makes no difference."

I said that was one possibility to think about. What if there is a way to get that hook out of your brain?

"Right Doc, you are going to outsmart all those fat cats and unhook us. Fat chance."

Our purpose in this class is to identify unique human qualities that can be developed so humans can manage the coming threat of artificial intelligence.

Based on these qualities, we all need to brainstorm, share our personal experiences, and work together to model an education system for the future; a system that will enhance individuals and our species.

As we accomplish this, and ensure that it has a fat chance of working, we can develop something great that will help advance our species so that we are in control of data-driven artificial intelligence and not the other way around.

Chapter 3

We live in a society that builds upon the past, and we have an education system designed for a way of life that no longer exists.

In the comfort of my reality, I think back about the campfire conversations earlier in the evening. It made me recall so many discussions I have had with my colleagues over the years about how and why the public education system needs to change to better meet the evolving needs of students. I've been fighting this battle to transform our education system for well over fifty years. Too many teachers cling to their approaches and their lesson plans; their assumptions about kids and how to teach them. They fail to prepare students adequately for the future. I nearly came to blows with peers, and good friends, when I asked them to examine what they were teaching, how they were teaching, and the information they were requiring students to learn.

They came back at me. "What person or group in their right mind would question lifetimes of collected wisdom and experience?"

I countered, "You just don't get it, do you? What you think is true—what you think is important today—may not be relevant in the world we are preparing them for."

"Berger, what in the hell are you implying? I've taught kids for over twenty years. I know the fundamentals of what they need to know!"

"Yes, but that was then, not now. Students today are very different. Their access to information, and the application of mathematical concepts to solve problems, is changing. Even math formulas that they once had to memorize, are at their fingertips."

"Like hell, you say, Berger. Your radical ideas are going to hinder their growth not encourage it. They have to know how things work and calculators bypass that step."

I recall how I tried to explain to many of my colleagues that of course the past contains lessons that should never be forgotten, but we are teaching students with evolving skill sets who will live and work in a future filled with technology.

Now, looking back from this dawn age of technology, where computers are ubiquitous, it is

amusing to think of those ongoing debates that took place in classrooms with giant slide rules mounted above the chalkboards; discussions about the damage hand-held calculators might do. Similar arguments about the use of computers and tablets in the classroom rage on today. Our education system is over a century old and was developed in the industrial age. We have to adapt to the changing conditions of the world our students will live in, and prepare them for future technologies.

The interesting thing is, that we continue rejecting change at a time when every kid has access to infinite amounts of information and can sit in class and pull up facts on her device that exceed what the teacher knows. This is threatening to many teachers who decide to stop the world and hold it still, so they can do what the universities and teachers colleges trained them to do. Those institutions are part of the problem.

I recalled the endless discussions with my peers. They argued that there are important lessons that every American must learn from the Civil War; from World War I and II. They complained that some smart-ass editors are suggesting that we minimize or delete those units from our history texts. They countered with their concerns. "My grandfather died

in France in World War II." "My father fought in Iraq." "There are lessons to be learned, sacrifices made. It must be taught."

"It is our history, but . . ."

"It is American History, Berger! How can you not understand?"

I came back with questions that I hoped would put their concerns in perspective. "What about Korea? Vietnam? Desert Storm? Iraq, Afghanistan, Syria? Is forcing a student to learn the details of what happened in these battles relevant to a twenty-year-old in 2024? What will be important to a fourteen-year-old in 2030? 2040? Certainly not the economic crash of 2006."

I knew in my gut, even three decades ago, that what we were teaching was not relevant to the world the students live in, and certainly not relevant to the future where they will have to function. But I was only prying open a little window into the future.

Decades later, I see that many of the skills and content we taught worked well in the 1950s, maybe even into the 1990s, but are next to useless in 2020. I try to explain the need for typing to a girl who has mastered text messaging with her thumbs on her iPhone. Chances are, she is using voice-activated input systems to write.

I try to explain to a university business school student why, in order to learn how to run a business, she has to take introduction to accounting and two years of business accounting centered on data entry and accounts balances when these are tasks that computer accounting programs now do.

No one could explain to me, even at one of Colorado's top law universities, why I had to sit through a quarter course in how to use a law library, when today, lawyers use computerized bots to search law libraries for precedents and prepare for cases. Libraries subscribe to online data bases, so we no longer need to pour over volumes in the law library.

Very often educators focus on the need to understand a process, and ignore teaching students how to derive value and get results. This results in education without immediate and practical application.

I learned that many of our teachers, even those recently graduated, are as outdated as the textbooks we use; textbooks that are usually at least ten years out of date. Colleges of education often tenure faculty that are tied to their prime in the past, while the world spins beyond them.

I have great sympathy for teachers who are standing before their captive audiences and talking

away about subjects that are already mastered or in daily use when the kid goes home and enters a MOOG (Multi Player On-line Gaming Program). Many students spend time in virtual worlds. Many play at least one avatar and are learning to write code. We assume, when the student falls asleep in class, that there is something wrong with the kid and not the teacher, curriculum, or education program.

We live in a society that builds upon the past, and we have an education system designed for a way of life that no longer exists. It made sense until the rapid developments of the last thirty years put us in a position where we can't catch-up. It is a given that most of the information we are requiring students to master will be out-of-date, not relevant, or readily available to them through technology by the time they are ready for adult life. Because of the internet and the computer, the information revolution is moving forward at a mind challenging pace.

So, what do I really want for these students? What I have learned is that kids have an investment in their own future. They are open, not closed down by past experiences. They are open, until we slam the doors shut and convince them they are locked. The tragedy will be an education system that continues to force uniformity and discourages creative thinking.

In preparation for our next campfire, I have to smile as I use the internet and Google to look for information about what some leaders think about AI.

> Elon Musk, the inventor and CEO of Tesla and SpaceX. Humans must merge with machines to overcome the 'existential threat' of artificial intelligence. Artificial intelligence is just digital intelligence. As the algorithms and the hardware improve, that digital intelligence will exceed biological intelligence by a substantial margin. It's obvious we're way behind. We're like children in a playground. We're not paying attention. We worry more about what name somebody called someone else than whether AI will destroy humanity. That's insane.

> Apple CEO Tim Cook is concerned about people hanging on to their humanity. They're worried about machines taking jobs and AI sort of replacing humans. My worry is not that machines will think like people—it's that people will think like machines. And so that to me is a much bigger worry.

> Henry Kissinger argues that powerful artificial intelligence could replace human thought with data-driven decision-making. If that happens, AI could chip away at our ability to think critically. AI, by mastering certain competencies more rapidly and definitively than humans, could over time diminish human competence and the human condition itself as it turns it into data.

How do we teach to allay these various fears? How do we exercise and expand human intelligence capabilities, critical thinking, creativity, empathy, and problem-solving? I know there is a vital place for humanity in this world of AI. My task with these kids is to spark their imaginations and thinking to design an educational structure that will support and prepare them for success in their future that looks very different than what we had envisioned.

As the class begins, I look forward to turning power over to the students. Unfortunately, within the system, they have been carefully conditioned to give up their power to a teacher who leads the discussions and channels their energy into pre-determined solutions. They haven't been able to take charge and learn how the systems work. Standardized tests and top-

down coercive systems have been designed to keep them passive.

In this class I must empower them to take the lead, do the research, and accept the teacher as mentor, guide, and fellow learner. This shift is critical to the type of instruction future schools must develop. It empowers self-direction, problem analysis, and effective problem-solving and decision- making.

From years of teaching, I know that as power switches from the teacher to the student one must follow the directions and issues identified by the student. To a scripted class leader this will seem chaotic. But it is through this very process that deep learning and individual growth will take place, for each of us. Students are not identical clones in a factory, being manufactured on some academic assembly line. In this day and age, the industrial model no longer applies. Our challenge is to evolve the education system to prepare students for their future; a future we can barely begin to predict.

Chapter 4

Listen to Jo's song about being one with nature. Lyrics are poetry. Let your mind open to the music.

Greetings everyone. I wondered if you guys want to do a campfire meeting tonight?

"Are you kidding? We've been messaging back and forth for days."

That's great. It is important for each one of you to take the initiative for your own learning. I can't predict where we're going, but I have confidence you can figure it out. I think you all have the power to create a model for schools that will better serve your needs in your future.

"So, you get us all riled up and then tell us that it is our job to figure it out? Then you tell us, and we think we believe you, that

everything we do and think and believe in is data to be mined for some ulterior purpose—most notably the extinction of the human species.''

Frank, I didn't even bring up biological processes that are also being developed, like growing replacement organs, or repairing genes that are defective. I didn't mention that the data being collected may be used to indicate whether you are genetically inferior. It might be used to determine that you are a poor candidate for having children of your own. This is very much the stuff of science fiction nightmares.

''Doc, Hold on a minute.''

What's your take Annie?

''You're saying there is no free will? We're driven by hidden processes with no choices and no hope? I'm not sure I buy that.''

I'm saying there is no such thing as free will in the world of computer-driven data managed by artificial intelligence.

''I'm making decisions about things every day. Don't we always have a choice?

Do we? I'm asking you to question it. And if you come to believe that it exists, I am asking you to design the school of the future where we can teach how to be the masters of the machine and technology dominated future that lies ahead of us.

"Can't we just roast marshmallows and make s'mores? You know, ignore all this?"

Now you're talking. What AI program could object to that?

"Doc, even a computer can be gummed up by the sticky of s'mores. I think we have an answer to our quest."

This is a great campfire. A perfect time to focus our thoughts on who we are, how we relate to the natural world, and what qualities humans have that AI cannot replicate.

Listen to Jo's song about being one with nature. Lyrics are poetry. Let your mind open to the music.

"Meditation on the Trees"

Night is falling
The campfire's calling
It's been quite a day

I'm making my way
To the fire.
Embers glowing
Wild river flowing
Tumbling down, smoothing me round
Like a stone

Feeling the seasons change
Sensing the sun and the rain
Clouds in the night
The moon in daylight
The cycles of life wax and wane

I smell the sap rising in the trees
I feel the pulse, the harmony
My blood is quickening quickening
I am a thread woven in this web
Of summer nights filled
With fireflies
Scorpio's rising across the sky

I can find a quiet mind
When I breathe in river time
A different kind of knowing
I feel my consciousness growing
I am one with the Forest
One with the Trees

Do they worry, do they fret
Are these trees burdened with regret
One with the Planet
They don't ask 'Why?'
Every moment so alive
I think they do not know
A questioning mind
They live and grow
Follow Nature's signs

I feel the pull
Of the moon and the tides
The rise and fall
An emotional ride
I am the Ocean
I am the Sea
I am the Forest
I am the Trees

The birds are chittering chittering
My soul is glittering glittering

That song fits right in to what we are talking about. Connecting with something greater than ourselves. Let's each decide how free will can be connected to personal destiny.

"Doc, I don't think I understand what you mean when you say personal destiny."

It's an ontological question; a question about the nature of being. Who am I? Why am I here? Where am I going?

"And you don't think the deer or the trees ask questions like that? How would you know, Doc?"

Bob, that's a good place to start. Does a packrat or a horse seek answers to its existence? What evidence would we need to know?

"Oh, you mean do creatures in nature believe in God? Are we the only ones? Do they pray to some other source of power in the universe? Do they filter their experience through a conscious mind that is separate from their instinct?"

What do you think?

"I don't think they have religion or pray to some other source."

So, you believe religions exist just to provide human beings with answers to ontological questions? Then you must believe that it is part of our

inherent nature to be asking these questions and looking for answers.

"Doc, you are trying to trap us."

Why do you say that, Sarah?

"Because that is one of those religious arguments our pastor warned us about. You know, did God create man or did man create God in his own image?"

No Sarah, and no again for anyone else that thinks I am questioning your particular religious beliefs. Does anybody want to venture a guess as to why I steered the conversation this way?

"It was me. I mentioned God—religion."

But why?

"It was about who asked the question; who wants to know. We are seeking answers."

Do you agree with Bob, Sarah?

"Well, I see that it doesn't really matter if God is the answer. What matters is that everyone here, probably everyone everywhere, is asking the 'big' questions. That must mean

there is something in us that is seeking answers that are far above what all the data and computer-based algorithms can identify."

Go Frank, you don't have to wave your hand. Just chime in.

"I think it means that far beyond all of the biological and computer-based information, we are a species that may be evolving into something new—maybe we have always had mental abilities that are unique, we just weren't taught to recognize and trust them. But we need to exist because we are something . . . not only of this world."

"Hey guys, I wondered what a guy with a great mind would think about all of this. I Googled quotes by Albert Einstein. Here is one that I think fits what we are talking about."

> Strange is our situation here on Earth. Each of us comes for a short visit, not knowing why, yet some times, seeming to divine a purpose. From the standpoint of daily life, however, there is one thing we do know: that man is here for the sake of other men—above all for those upon

whose smiles and well-being our own happiness depends.

Wow Claire! Let's take time to think about that. I'll be back in a bit, I'm going to get a cup of coffee. While I've dropped out, keep identifying what makes us different from other animals and what is inside each of us that is beyond AI and data-driven programs. I only have one request. Everyone must be involved and participate in the process.

"Yeah. But before you go, I have something to add, I guess, well, maybe something you don't want to hear."

Shoot Frank. What are you thinking?

"How can any one of us have a personal destiny? Sure, we might think we do, but . . . we can't exist alone. I mean we group together in order to do everything. None of us can survive if we alone have to feed ourselves. I mean, we can't raise food without lots of systems in place to bring water, select and harvest seeds, plant and protect crops, and you know, our species, as you call it, never survives or does anything as individuals. We survive if we have systems of cooperation and

sharing. Alone, we are nothing. There can be no concept of the individual because everything depends on working together, as a version of an extended family . . . well, I mean, having information and support from others we may not even be aware of. I'm not even talking about the loneliness factor. At the end of the day, isn't our personal destiny always influenced by group participation?"

Frank, I like your thinking. Bob, why are you shaking your head?

"Frank, you really piss me off. Didn't we all agree that each of us is special . . . unique? I mean, that we are not like other animals! Maybe we have evolved into something else?"

"Hold on a minute, I'm trying to figure this out! I am Mary, an individual. I exist as a separate entity, but Frank is saying I can't exist without others. Is he right? And Doc, didn't you ask us if the eighty million people murdered in World War II mattered? Does what Frank is saying mean that they only mattered if they, all of them, changed the destiny of our species? If so, as long as the species survives individuals don't matter?"

"Mary, I'm trying to understand the same thing. Here is my take on it. I'm Steve, I'm an individual. I have a name, friends, a life, an identity. But all that doesn't mean much to computers. We exist purely as data. I think that's why Doc said that individualism may only be wishful thinking. They gather up all the information about us they can find, and then they make decisions based on the aggregate, not the individual. No individual rights, no individual value. Our unique identity no longer serves a purpose. If we serve no purpose, we become a dead-end species and there is no reason to have us around."

Mary . . . everyone . . . is that a verifiable point of view? Is it accurate? Sure, if no other information comes along that refutes it. As you've noticed we are a group of what we call individuals. As a group, we are trying to identify how we can preserve ourselves regardless of what computer-logic construes. We can collaborate with others of our species and get input. If we learn something that is vital to our survival, we can share it through the networks that may be unique to our species. We are individuals working as a group to unite others. We use our creativity and compassion to positively evolve our

species. Computers may view individuals as data that can be replicated, but we have a collective human intelligence, a Universal mind, that embraces more than the technological systems that potentially threaten us. Our goal is to create an education system that develops the human capacity to counter that dead-end; to explore the greater, creative aspects of our minds and beings.

"Doc, I agree. What we really need is a way to prepare people so that they understand what we need to learn not only to survive, but to flourish. I mean, what has to happen to our education system so that human beings can go on and use technology to advance something important about us that is beyond work and logistics. Bobby, do you agree with me?"

"I think adults are too hard to change. It has to be up to the kids. It's like your slide rule example, Doc. Our schools are focused on things that won't even be around when we graduate. They are testing third graders like my little sister on arithmetic skills as if acquiring skills like that have to happen by third grade. There is little urgency to help kids learn together—you know, cooperate and use that

collective human intelligence you were talking about. We are all studying for the SAT or the ACT tests. Very little of what I've been memorizing has anything to do with what I need to know tomorrow—you know, hold in my head. Most of that stuff seems to be focusing on things that were important years ago. A lot of the information they want is stuff I can use tools like computers and iPads to get. I don't need to have it in my head, I just need a device and a few lines of code. Nothing on the tests charts my growth and development as an individual.''

Bob, that is a critical point. What you are describing is summative data vs. formative growth. Computerized information is based on summative data. That is the basis of AI. Formative data is based on the point-to-point growth within individuals and groups. One is a kind of cold, calculating, machine intelligence and the other requires a human touch.

By the way, don't assume that all human beings will be evaluated fairly. I can tell you that all tests are culturally biased and are based on only one or two types of intelligence. We know from Gardner's work that people approach learning in many different ways. Some of us are primarily

verbal-linguistic, but others might be spatial-visual, or logical-mathematical. Your type of intelligence might be kinesthetic, intrapersonal, interpersonal, or musical. More intelligences are being defined all the time. Tests don't take that into consideration.

To date, schools and testing have been set up to teach the 3 Rs: reading, 'riting and 'rithmetic. We are identifying that human beings have other attributes that will be much more important in the future. These are the 6 Cs: creativity, critical thinking, collaboration, communication, citizenship, and character, that reformers like the Canadian Michael Fullan, the Global Leadership Director of the New Pedagogies for Deep Learning, describe as the 6 Cs necessary for twenty-first century education. That runs counter to what many so-called 'reformers' think. They still perpetuate the old petrified belief system that what schools are for is to teach students the 3 Rs. They are fixated on standardized testing because it gives them a simple way to measure the mastery of standardized facts. The real issue is, how do we teach and test for the 6 Cs? That seems to be one of the main challenges as we go into the future.

We have said education is the key. And we have described two types of education focus, the 6

Cs and the 3 Rs. Here we are around a campfire in America and we are going to explore ideas that change things for all the people on Earth. That is a big challenge. How about we narrow it down in some way? If we can't help all of humanity, how can we get the message to those who will listen?

"Well, we can identify the qualities that humans have that are worth saving. We are a pretty advanced species after all."

I agree Steve, but what do you mean by advanced? In many ways we still kill each other. We pollute the planet. We exterminate other species on earth. We have religions that, well, they've lost our respect.

"So, what you are saying is that we have to identify human traits that need to be preserved and enhanced? I'm wondering if 'perfect' humans even exist. Isn't it all pretty subjective? Doesn't it really depend on who is in control."

"My dad is a doctor. He says that with bio-engineering . . . you know, gene modifications, organ replacements, and stuff like that, a few humans, the ones who can afford it, will be made into super humans with enhance-

ments that let scientists select healthy and superior genes. That way they can stop many genetically transmitted human weaknesses, eradicate diseases, make people smarter, and extend human lives, for a much longer time. And they can grow organs that can replace those that are failing—you know—fix humans so that we live better, longer, and are superior all around."

"Good grief, Bob. We may be able to create a super human, but that would create a new super race and who decides who gets the upgrades? Anyone regardless of race, gender, and color, or is it only for rich white people?"

"Well, I think we have to look at reality. My Dad says the Chinese are way ahead of us and whoever creates these advances will only give them to those they believe deserve them."

Interesting. Is there anyone of us that does not believe that we deserve biological and genetic upgrades, if they are safe and work? There are almost 8 billion people on earth now. What happens as we keep reproducing and living longer? We are already taxing the planet's ability to sustain us. What happens to the people who are rejected? Will

data gathered on computer data bases, when evaluated by AI, make a list of those who can be altered? What if you do not meet the summative testing standards? How many of our fellow humans will not be able to afford, or will be of the wrong intelligence or race to get upgrades? Why would those who are not selected have a right to live? The super humans might argue that those multitudes are inferior and should be eliminated. So why not weed them out? The species will survive in a much-improved form? Will this create a new spin on 'survival of the fittest'? What do you think, Claire?

"I don't know. I agree that we have to decide what human qualities are worth preserving and how we can achieve some kind of balance with the power of technology. I think we may have to be idealists and create those behaviors. You know I'm a sci-fi nut, right? Well, I mean I read and watch a lot of science fiction. What we've talked about here is not new to me. Most of what I know assumes that we are going into space; that we can solve our population and social problems. Roddenberry's stuff got people thinking about the future where humanity develops just like we are talking about. Star Trek mentions a great

world war. Maybe a war that removes half or more of the population is in the making. I hope not. But to Star Trek fans, the future of our species is really bright. We meet other species that are at different levels of development, but we are always the good guys with strong, respectful, and inclusive values. Well, Doc, what I'm saying is that some people have been thinking about our distant future for a long time.

Did anybody watch the movie, The Expanse? Have you read Illium? They got me thinking that AI is just another tool for man to use—if he uses it properly. What I wonder about is how we educate people so they are ready to use tools like AI, and bio-engineering, to adapt to the great changes that lie ahead for the future of humankind. If we don't do something, we won't have a future; let alone a bright one. A machine age could end people.''

Let's regroup next Wednesday night and share what we've processed. Reach out through the internet and see if you can find other people who have had similar questions.

Chapter 5

We have to assume that we can make the future better, even if the present is crumbling around us.

I'd like to start by prompting you with a few questions. As you answer, try to draw on your own personal experiences in the school system. Why do schools exist? What are the schools supposed to accomplish? What is education? What do teachers do? How do you learn best? How does education need to change to meet the needs of students and society?

"My dad says that schools have changed a lot since he was a student. In those days, he told us, the primary purpose of a school was childcare and socialization. The next important parts were the foundations in reading, writing,

arithmetic and higher math. Sports, and activities like art, music, and clubs followed. I think they also prepared students for jobs in industry and corporate America."

"Your dad should know, Claire. He's a university professor. But you said he thought that schools have changed a lot. My school seems the same as its always been . . . old, rigid, the teachers tell us what to do, and we do it. I may have missed something, but what has changed?"

"Doc, our school is basically like his school. With the addition of some computers and the internet. With cutbacks we don't have much art, music, or other creative courses. In fact, we don't even have certified teachers in some classes. If schools have changed, it seems it is for the worse."

"You guys, my mom and some of my teachers too, say that in the last thirty years some billionaires have been trying to destroy public schools by privatizing them so that they can dumb us down, control us, and make a ton of money by milking the system for their personal gain. I don't mean to sound paranoid, but it sounds kinda true. Every class I have has

had to cut supplies and increase the number of students. Or they only offer the class once a year . . . some are just cut, like civics geography, foreign languages and . . . well, we all know.''

''Claire, I think we're being cheated. These are powerful people that are trying to destroy American public schools; the really good schools like your dad went to twenty years or so ago. Doc, maybe instead of working on the future of education we should be working to save the public schools we have now.''

You all are right-on. You are victims of powerful forces in place today that want private access to the billions of tax dollars collected for public education. I think some of the people who are working to change public education are sincere, but the almost exclusive emphasis on summative measurements for teachers and students reflects an attempt to treat students like items on an assembly line. Run each student through its paces using standardized testing, and evaluate the efficiency of the system based on the number of widgets that pass predetermined benchmark criteria. I think we all agree that it is individualized formative goals, a

measure of point-to-point growth, that offers us a more comprehensive assessment.

I have no question in my mind that destroying something to save it is the wrong way. If they were working to evolve the public schools by developing other successful approaches that could be imported into the public schools, then I support that. That was the original rationale for the creation of charter schools—that and increased accountability. But, to starve and destroy public schools, hurting children, families, and ultimately our nation, to generate profit using unproven ideologies, is not acceptable to me.

What do you think? Is the public education system worth saving? If we don't know where we are going, can we make education vital for the future? Are some approaches more effective than others? What skills will you need? How do we go about making a plan?

"Geez, that is huge. We need time to think about all that . . . to break it down into smaller pieces. I mean this really throws us a curve. What do you guys think? I, for one, believe we can make the future better. Figuring out how, now that is a challenge especially when so much of what we see and experience

is falling down around us. What do you think Annie?''

''I think we all feel frustrated just like you, Dan. I have an idea about what we have to do. We have to know where we are going—at least set a target. If we don't, we can't slow the present disaster, and we definitely can't be effective. We must describe what we need and what the world needs to deal with forces that will shape the future—things like AI and smart computers, and even societies run by cold, unfeeling, non-human machines. We have to think forward—not back. We have to be creative, but cherry-pick what was good in the past to use as our base.''

Okay, let's break here. We can reassemble Tuesday evening.

Chapter 6

I think we have to know the difference between intelligence and consciousness.

Jo, will you play a little bit of your song 'Deep Yellow Moon' for us? I love the first part about the coyote and the canyon.

Deep yellow moon
The paintbrush is in bloom
The coyote sings a song
that fills the canyon
I realize deep within my heart lies
A feeling for the land
I won't abandon

Do you remember when this land
was rough and free
Neighbors lent a hand
in days that used to be
They worked the land

with horses and a plow
a laying hen, and an old jersey cow

Rich fields of green
Dryland pinto beans
Orchards that strain every bough
Wild birds and leaves
Stirring cotton in the trees
There's grain enough
to fatten every cow . . .

That set the mood perfectly for this evening. Thanks, Jo. Before we pick up on our discussion of where our education system should be headed, I think we need to consider the matters of EQ, your Emotional Quotient, and IQ, your Intelligence Quotient. Just like summative and formative evaluation, they are different systems our culture uses to assess the status of individual capacity. IQ is talked about a lot. EQ, less so.

"Hey Doc, I've never heard the term EQ. I think I know what IQ means."

Well, Ben, Jo's song probably touched your emotional quotient or your EQ; your feelings about the land. IQ is a lot more complicated and confusing and harder to pin down. Like summative evaluation

it is based upon selected information, and the time it takes you to do certain tasks. We have used IQ for decades and done great damage to people who are fully intelligent in areas poorly measured by summative tests—artists, philosophers, and thinkers like Einstein. Many years ago, Dr. Howard Gardner, a professor at Harvard, showed us how there are multiple types of intelligences. We have a system that only looks at one or two types and gives us a number. For example, on the IQ scale, an IQ of 100, is considered to be average. And, it is based on speed and accuracy. If we are thinking things through, thinking more deeply about issues, it may take longer to do tests, so your IQ will be scored lower.

"So, if I feel something, it is with my EQ? Like with my heart?"

Emotional Quotient is the parts of you that make you human. Computers don't have EQ. There are parts of you and me that deal with self-awareness, empathy, compassion, and dealing sensitively with other people. Empathy is perhaps the most important. It is the ability to feel things beyond yourself. It is awareness of other beings and things. It is the awareness of compassion and even

sympathy and sorrow for others. It is also spirituality. Equally important, it is the capacity to understand great art, nature, love, and life.

"So, it's our empathy, our EQ, that sets us apart from intelligent machines? Doc, are you saying that we don't have to fear computer-driven data and AI?"

You have to draw your own conclusions. I am just defining terms. What do you think Mary? What thoughts do the rest of you have? To move the discussion forward, we have to decide what this information means to each of us.

"I know what I think. I think we better have programs in our schools that address EQ, as well as IQ. I think all the knowledge in the world can be jammed onto thumb drives and utilized, but the schools of the future must develop our innate human qualities, our EQ, to control how machines use that information so it serves us, even with our flaws, not some machine intelligence."

"Mary, Steve . . . hey, all of us agree. Let's make sure education focuses on human needs, not just data-compiled by tests and machines that are observing us for patterns

and inefficiencies . . . and I don't mean just us, I mean humans everywhere."

Do you assume that computers won't accrue data that lets them develop an EQ?

"Do you think they will? I mean, can they? How could they? I don't think a computer can be human, which means they can't develop an EQ."

"Maybe that will be their greatest challenge—to become more like human beings. Remember Data, from Star Trek?"

"Yeah, but do we know enough about being human to make that assumption? We aren't always acting as our higher selves you know. We are capable of the deepest acts of love, but also the most horrific atrocities which counter our higher selves."

"I think we have to get a handle on the difference between intelligence and consciousness. Machines may possess a well-developed intelligence, but it seems pretty unlikely that they will ever obtain a state of consciousness."

"Bob, how about we make a list of what makes us different than our data-driven AI competitors."

"Like we have friends? Like we reproduce biologically and not by manufactured parts? Like we know and love other types of life, like plants and maybe elephants?"

"And we care, Dan. We have the capacity to care, and I don't think computer AI can give a damn. Computers can't love—make love to reproduce, or love to bond. And computers can only use data that is programmed into them. They have no imagination or ability to think beyond the data they gather."

"Wait a minute. We gather information from five senses. If we don't have that data, we can't think. If we don't have names for things, we can't turn thoughts about them in our heads. Is there something about us that computers can't have? Well Is there?"

"Maybe, Steve, but how can we find out? This process we are going through should tell us."

Okay, but before we break, Jo asked me to share some song lyrics from a friend of ours. Singer-songwriters often give us a window into what others are dealing with. They have a very strong EQ. They have empathy for the forces that are twisting and gnarling people's lives.

Eric Ramsey is a fine poet and songwriter. He wrote this powerful song about what dis-enfranchised people are experiencing. Our current political situation is in many ways a result of people crying out for representation. In this song, he shares what is going on with people in what we now call the rust belt of Ohio, but it applies to people everywhere who are caught in similar situations. I know you will be touched by his observations. I can't think of a better way to define Emotional Quotient than Eric's song.

"Around Here"

Holes in the streets,
holes in the windows;
Shot full of holes,
the bones of this old town.
Ghosts in the alleys,
Rust in the hearts
of the few decent folks left around.
Down the street we used to hear
laughing children on the playground
over by the elementary school.
And the rattle, clank and clack
of that noonday freight
out of Dayton,

HUMAN COMPETENCE

You could set your watch by it,
the old timers knew.

Those laughing children all grew up
and moved away,
or went to war,
which is what usually happens
if you're poor and otherwise adrift.
Those who returned
mostly came back in pieces;
their bodies and their minds and
souls bereft.
Now how do you tell a young person
who's come home
to the only home they've known,
fresh back
from some modern-day hell,
that there's no work, no proposition,
no future around here.
No future—oh, but by the way—
thanks for answering the bell.

Weeds get higher all the time.
Each day another hill to climb.
No one out there has any time
for us around here.

We had a visitor once,
few years ago.
Some old red-faced fat man
come down from Washington DC.
Didn't look to me like he'd ever
missed too many meals,
while some folks' kids around here
didn't have enough to eat.
Well he went on and on and on
about the changes that were coming,
if we'd just be patient
and bide our time.
We all heard between his words,
though,
something he never came right out
and said which was:
You'll get yours when I get mine.
Then he rode off
in his big black Buick,
tires hissing
like god's own serpent
on the greasy street.
And we all knew as we watched
those taillights disappear
into the distance that we'd
just been left to our own fate.

HUMAN COMPETENCE

Weeds get higher all the time.
Each day another hill to climb.
No one out there gives a dime
to us around here.

Home prices and interest rates
aren't the only things depressed
around here.
Hell, just poke your head into any
of the tatty neighborhood bars.
You can pretty much always find
another unhappy soul
to let you express your opinion
as long as you promise
to listen to theirs.
For the price of a pitcher, or two,
and maybe a game of pool,
you can articulate,
gesticulate,
vituperate,
and pretty much hate
everything that's happening in
your life.
But everyone around here
tends to agree
that it's better this way
than going home,

kicking the dog, and
fighting with your wife.

I'd like to tell you all that
this tale has a happy ending;
some theatrically inspired
uplifting denouement.
I'm afraid you'll have to come up
with your own happy ending,
to your satisfaction
Because I can't.

Weeds get higher all the time.
Each day's another hill to climb.
No one out there gives a damn
about us around here.

Folk songs often give us an insight into our society and our fellow travelers. At some time, if you are interested, use YouTube and listen to Leslie and Larry Latour and their song, *Making Paper from the Wood*. It has a similar theme. These songs of compassion for the difficulties of others represent human qualities that are not within the AI skill set.

Chapter 7

Excellent teachers have always avoided telling information.

"Doc, last night's campfire kept some of us awake for a long time. I know now that I am developing a powerful EQ. I just didn't know what it was before, but now that I understand what it is, I love that part of me.

We knew identifying what makes us different than computers would take a lot of work, but not that we had to have answers, too. I mean, we really thought you had all the answers and would tell us, eventually. You know, that's the way it usually works."

Right, Claire. Teachers are usually teaching in the same way they were taught. That old model didn't work for me. Think about what we are doing now. As your teacher, I am searching for answers

and so are you. This could provide an insight into the school of the future. Are teachers tellers of information or do those who teach have a different role? How can we design an education program that tasks students and teachers with working together to find information, solve problems, and develop innovative solutions as co-learners?

"But if you don't lead, how would that work? It seems like instruction flows from the teacher's knowledge base and resources, while students listen, follow directions, and obey. I mean teachers know where we are going and they streamline the way for us to go. Don't all teachers have to follow a set lesson plan?"

"Claire, we should try Doc's different approach and see what happens. Let's use him to keep us on track. We can ask questions, but he won't give us the answers. He'll admit he doesn't know, but he'll also share some of his experiences that might help us find things out for ourselves. He can be more like a guide."

"Frank, we don't need teachers to retell us facts anymore. We have Google, Wikipedia and tablets for that. The world has changed, there are better sources of information; and they are readily available. What was that

expression my coach used—the teacher is the 'sage on the stage'. That is an outdated method of telling and acquiring information. It predates our technology and our ability to get information for ourselves."

"Yes, but the 'sage on the stage' can be a storyteller. I enjoy stories that help me remember."

"So, Doc, you are saying that in our school of the future we would change the role of the teacher? I agree, but what do we do with all the teachers and materials that are already in place to indoctrinate students?"

Excellent teachers have always avoided telling information. Think back to the teachers you had that got you thinking and motivated. Good educators have always known that if they were working up a sweat, you weren't. Sure, many of us have struggled in this age of information, and the fact that each of you has access to information far more complete than anything we have in our heads or our lesson plans. For many, it is also a joy to teach in this time where rather than trying to transfer facts, with understandably poor results, they can stimulate, motivate, and help you become a self-directed learner and critical thinker. They are ready

for the future, but the system is slow to change and give them the support they need. Almost all of the current rush to testing and obsession with summative data is out-of-sync with learning and the skills necessary to survive in the future.

"But Doc, we will be forced to change the whole system. I agree that we can know where we are going—I mean education must adapt but the force ain't with us, if you know what I mean. The inertia is against us. We will be pushing against the river."

"I agree with Dan. The whole system is frozen in place. It's like we push into it and make changes in our school, but after we look away, everything pops back the way it was."

"You guys are so negative. There are plenty of examples, I'm sure, of how to change things. What's important to remember is that our system was designed and functioned in a very different time; it is at the end of its effectiveness. It is becoming more and more apparent that American students are falling behind what was expected in the past, and that is probably a good thing. For many, teachers included, the need for change is becoming obvious."

"I agree with Mary, and I'm confused. We have no way of knowing what is in the future. We could be wrong about what is needed and waste a lot of time and energy. How do we know we are on the right path? How do we test our assumptions? What if we all don't agree? Come on, Doc, can't you give us some direction here?"

"Wait a minute, Annie. Doc said he doesn't know, and he wants us to come to our own conclusions, not just his. I bet if we start brainstorming, we will find we know more than we think we do. We can do it."

"Okay. Steve, I agree. We have already talked about some major areas that have to change. We should continue the way we were going. We started talking about the 6 Cs. Let's make a list and update it as we go along. We can identify key elements that come out of our discussions. That will be the test. I think we are on the right path."

"Okay, so let's get back to the 6 Cs and take it from there. Remember these are formative skills; how we grow and learn as individuals. They are different than data-driven, summative, knowledge-based skills. Let's work on our list."

"We have identified the 6 Cs: creativity, critical thinking, collaboration, communication, citizenship, and character. These are global competencies. Do we all agree? Just shout out what comes to mind!"

"Let's add compassion."

"I would add self-directed learning. We have to find the information for ourselves—each of us—and be our own driver. We can't be programmed. No top-down coercion."

"How about passion? Humans are motivated by our passion."

"I would add social skills—like we are developing here."

"And do you know what guys? Networking and negotiation skills."

"If we are serious about changing the world and protecting all of us from data-driven, computer-based AI, we are going to need universal skills that are not culture-specific. We need ones that don't just fit our concepts of life, but are designed to fit other cultures and ways of doing things too. We need things that have a common, universal thread."

"And we have to know if what we come up with fits a range of intelligences and ways of thinking."

"The danger will be that we discount people and cultures that have other values, or lack . . . well this sounds bad . . . lack the skills to participate. Sorry, but what I mean is that no human can be left for the machines to manipulate . . . no one gets left behind!"

"And let's get it out there. We are superior in many ways to all the data-driven stuff and AI. We are more than data processors. Data will serve us, and not some non-human force."

Bob, looks like you captured everyone's comments. Could you send all of us your notes from this last discussion so everyone can have a copy? Let's break and give ourselves time to absorb what we've talked about. Should we gather around the campfire tomorrow night?

Chapter 8

Well that's what we are taught, see on TV, and learn in church.

Imagine a beautiful summer night. The moon will rise soon and it is almost full. In a few days it will still be shining after the sun comes up. Most people who have not spent time outdoors and observed the moon in daylight, are not aware of the moon's cycle. They don't expect to see it during the day so they don't look for it. To them the full moon rising in the evening sky is the big event and that's it for another 28 days.

"You're telling us the moon shines in the daytime? I've never noticed that."

Bob, I love to sit out on our south-facing porch and drink my coffee in the moonlight after

the sun comes up. I can only do that for about a week each month before the sun chases it into the western horizon.

I'll share another piece of unexpected information that you probably won't believe. In the last two decades the percentage of people on Earth that live in squalor or near starvation is decreasing significantly. The world's people now live in the mid-range of development. Yes, starvation, suffering, disease, and terrible things still exist, but in the last twenty years, many of our fellow passengers on this planet have begun to live with dignity. Most are being vaccinated against diseases. Most have food, clothing, and shelter. Girls are being educated. Living conditions for the world's populations are continuing to improve.

You think I just lied to you? I am willing to bet that in your minds you think we live well, and the rest of the world's people struggle and suffer. Right?

"Well that's what we are taught, see on TV, and learn in church. Doc, are you saying it was that way, but it isn't anymore?"

Exactly, Mary. Things are improving. There is new information coming forward now that makes

what we were taught out-of-date. I think it caught everyone interested by surprise. A man in Sweden, Hans Rosling, wrote a book called *Factfulness: Ten Reasons We're Wrong About the World and Why Things are Better Than You Think*. He compiled and shared correct and updated information about improving conditions around the globe. When we think of foreign aid, the Peace Corps, or the terrible damage wars do to nations, our minds have mental pictures of children starving, or sitting in sewage-laden water, or refugee camps. This is still a reality for far too many people, but the data shows ongoing improvement in overall health, education, poverty, and development around the globe. We rarely hear that information presented. In truth, what we hear is the opposite, kept alive because it serves other purposes. We ignore human progress.

"So, Doc, you're telling us this because?"

A guy by the name of Eric Bern wrote a book titled, *Games People Play*. One of the games that he identifies is, Ain't it Awful. In a way, what I've introduced you to at the campfires is me playing that game. Ain't it awful that this may be the end of our species, the end of man? Ain't it awful that all these technological advancements and bio-

medical advances will create a super race and we may not be in it? Ain't it awful that there are 8 billion people on this planet and we can't include them all?

Annie, Mary, everyone plays a game that keeps us from seeing the bright potential in the future. We are handicapped by a lack of positive information. What I'm suggesting is that we get the right facts and focus on what works rather than dwelling on what defeats us.

"I think I'm beginning to understand what we have to do."

Does everyone agree? Do you think our group of ten people can change our education system and prepare youth for the future?

"You have to be kidding. Why would any of us assume such a thing?"

George, that is a great question. I bet we all have some pretty good ideas. Let's check it out. What do we know about human beings? Bob, can you get our ideas down?

"We survive collectively—I mean we only survive if we do things that create the support systems we need."

"And what works for one works for all—

if it's good for all."

"New information is like vaccines. All but a small minority want them once their results have been proven. Think about advancements by individual scientists that were able to change the world."

"Education systems are now world-wide. Useful ideas will spread fast."

"A small group can change things by linking the information and new approaches to what people already know; what's familiar."

"Understand that AI and computer-based programs are tools, just like a knife and fork."

"People love sci-fi. They are ready for man's moves into the future. I mean a good future like in Star Trek: The Next Generation, where humans are the good guys."

"The world of twenty years ago is gone. Today will be gone. We only have tomorrow to plan for. I mean, I know a lot of yesterday's stuff is important, but you know, we have to create a system for surviving in the future."

"Yeah, and we have to know what forces are already gathering that we will have to deal with. Some are like carnivores in the bush."

"Okay everybody, here is our list. I looked up a simple explanation for each one of the items."

The 6 Cs listed by Michael Fullan:

Creativity - To use the imagination or original ideas

Critical thinking - Analysis and evaluation to form a judgement

Collaboration - Working with someone to produce or create

Communication - Imparting or exchanging information or news

Citizenship - Knowing your country's history and participating in its governing

Character - Mental and moral qualities distinctive to an individual

And we added:

Compassion - Sympathetic pity and concern for the sufferings or misfortunes of others

Self-directed learning - An activity under one's own control

Passion - An intense desire or enthusiasm for something

Social skills - Skills used to communicate and interact with each other

Networking and Negotiation - Collaboration, teamwork, problem-solving, decision-making

Not culture-specific - Universal, all inclusive

Wow, that is a great beginning. What if you take each item and jot down some of your initial ideas? That could help you figure out where you might need more information as your discussions take you in unanticipated directions. There might be more skills to add as we go along.

Jo, could you kick off our discussion of creativity with another song you wrote. As you listen to the poetry of her words, hold in the back of your mind a question: Can a computer using data and AI do this, or is this creative process uniquely human?

"Under the Milky Way"

I'm gonna travel 'round this country
I'm gonna see the U.S.A.

I'm gonna pack my guitar
Sleep out under the stars
And stare at the Milky Way

I'm gonna wind
through her hills and her valleys
I think I'll drive from sea to sea
Watch the northern lights
A blue moon shinin' bright
Wrap my arms around a
redwood tree

I'll build a campfire in the desert
Hear the coyotes yip and howl
I'll watch the aspen quake
by a mountain lake
Where the black bears
hunt and prowl

It's Fall and the leaves are turning
Colors flame in the wild oak trees
I hear a buglin' elk
standin' off by himself
I catch his scent on a sudden breeze

I'm gonna stand
on the banks of the Ohio

The Missouri and the
mighty Mississip'
I'm gonna walk with Sal
along the Erie Canal
Hike the back trails and
take a skinny dip

I'm gonna pine in the
Blue Ridge mountains
Pick some tunes
in the Tennessee Hills
Fish those mountain streams
My life it's a dream
I'll never ever get my fill
I'm gonna head down
the south coast highway
To find some mangroves
and manatees
I'm gonna dance around
to those zydeco sounds
Eat some crawdads
'neath a live oak tree

Well Nature she's just a wonder
So much beauty for us to see
We've got to stand tall
Protect it all

From the plunder
The waste
And the greed

So you better get out
and see your country
Take a good look before it's gone
It ain't happened yet
But it's a mighty sure bet
If we don't mend our ways
It won't last long
If we don't mend our ways
It won't last long

"That was great! Thanks Jo. I tried to imagine a computer doing any of these things. I almost laughed out loud as I imagined an artificial intelligence taking a skinny dip! I Googled creativity and found this definition."

> The use of the imagination or original ideas, especially in the production of an artistic work.
>
> Inventiveness, imagination, innovation, originality, artistry, inspiration, vision, enterprise, initiative, resourcefulness.

> Being creative means solving a problem in a new way. It means changing your perspective. Being creative means taking risks and ignoring doubt and facing fears.
>
> It means breaking with routine and doing something different for the sake of doing something different.

"Hey George, this definition I found seems really helpful."

> Is creativity a skill or a quality?
>
> Skill requires technique, you don't necessarily need technique to be creative. Quality is assessed by levels: bad, fair, good, excellent, and such.
>
> Creativity is neither, it is an ability to see beyond the ordinary, it is to use the mind and the imagination to create alternatives, possibilities, new and original ideas.

"What do you think gang? Looks like all of these qualities are uniquely human. I wonder. Machine intelligence is based on data and probably can be adjusted to generate

unique combinations, but creativity involves something more; something . . . spontaneous."

"Mary, do you think there are other ways to express creativity besides art? Can you be creative at any age? Is that learned or is it innate?"

"Try to remember how many times we were asked in our classes to create something really original. Do you think creativity as a skill was cultivated in elementary school? Middle school? Maybe by high school, it is too late?"

"As I think about it, Claire, most of my classes in all three levels didn't really encourage me to think creatively. They only wanted me to master the information that the teachers decided was important. I wasn't encouraged to 'think outside of the box.' Mostly, they wanted to teach me how to stay in it."

"We got to take classes in the arts in middle school and high school, until it was cut out of the budget. I had a few teachers that introduced art, music, poetry, creative writing, and activities in elementary school. As education became more data-driven, at least in my school, they cut out arts activities in favor of teaching for the test."

"My elementary school was pretty focused on those three Rs. The only time we got to do anything really spontaneous and creative was during recess or play period. When they let us out to play, we invented games, rules, and all sorts of imaginary things; anything else was considered 'daydreaming in class' and was discouraged."

"The same thing happened to me. When you think about it, creativity is one of the main skills we will need to live and work in a rapidly changing, technology-based future. Our education program should be exactly the opposite of what we experienced. We need to develop creativity in order to direct and master machine intelligence. We need to learn to use data and AI to make it work for us not against us. And to answer your first question, Doc, I don't think creativity can ever truly be duplicated by machines. It is a process that takes place over time and it incorporates both previous and ongoing life experiences. True, it can become finite in its final form, but it is born from the unique synthesis of the individual responding to the unpredictability of life."

Interesting! Lots of thoughtful ideas came out of this exchange. Next up, critical thinking. George, what does that mean for the education programs of the future?

"To me, it means that we have to teach ways to form judgements about issues. We have to teach students how to gather information about what we think we believe so that we can carefully evaluate our sources, our conclusions, and our actions. Everybody has opinions, but that doesn't always mean they are based on well-documented, proven data. Information must be weighed based on the evaluation of facts; we have to learn to spot the presence of bias; to sort fact from fiction. We need to apply these skills all the time, every day, as we are bombarded by social media, advertising, political ideology, news media, and the fear of all things unfamiliar. Being able to conduct a process of critical evaluation is a no-brainer."

Can we move on to collaboration? What do you think, Frank?

"Doc, I can't think of a better way to understand collaboration than by participating

in this class. As we are identifying and learning about the things we need to drive better education systems; it is the process of putting our minds together—of being sparked by one another—that helps us get to the heart of issues, get feedback, expand thoughts in new ways, and accomplish our goals.''

Well said, Frank! I think we are ready to move on to communication? Claire, give us your thoughts.

''Hey guys. I'm excited. This is the first time I've been part of a class where my opinion, my input, is respected and encouraged. I have learned that communication goes two ways between students and teachers. This is a whole new experience for me. I feel like I am changing from a kid being programmed by an adult, to a thinking human being who can lead and make a contribution. I also think communication involves not only the nuts and bolts of framing the idea properly, but it also involves expressing what is in your heart and your gut. Sometimes, that isn't so easy to do. Learning to communicate effectively is definitely an important life skill and I, for one, don't think

that heart and gut part can be replicated by AI. It is too reactive to the moment."

Thanks Claire. Anything to add? If not, let's move on to citizenship. Bob, what are you thinking?

"Being born in a place and having automatic citizenship is just the beginning. Civic responsibility is something very different. We have to be taught about how to be a good citizen. It starts in our homes with the way our parents—the adults in our lives—model good citizenship. In schools, we should provide a model of how citizens participate in cooperative ventures and government. We have to be involved, find our voice, and not be passive on the sidelines. In school, we can participate in democracy through student government, various service clubs, and the study of how our state and national governments work.

When I was a freshman, I couldn't wait to participate in We the People debates or the Model United Nations; two programs that provided opportunities to experience civic engagement first-hand. When my time came, the programs had been eliminated and even the civics classes were cut from the curriculum.

I think this is a big mistake. Civic engagement is the foundation of democracy; it counters the top-down coercion of authoritarian regimes. It may be easier in the short run to control people, but this type of intimidation totally undermines a true participatory democracy. We need civics to understand and maintain our freedoms.

Well, this is a long answer but every citizen must know our history and why we must preserve certain things.''

Wow, Bob, it's clear you have given citizenship a considerable amount of thought. I suspect that others have information similar to yours, and we can add that in later as we put more flesh on the bones of your ideas.

Next on our list of the 6 Cs is character. Mary, what are your thoughts?

''Doc, I was afraid you would pick on me. I am thinking about the qualities I want to have and want people—especially friends—to have. I try to develop internal controls, you know, like I don't cheat on tests because I have decided that it goes against my personal code, not because I fear that I will get caught. It is

because I value things like honesty, authenticity, and kindness. I don't make my decisions because God or some authority is watching me. I make my decisions because I am developing my own internal morality. I have experienced things that for me are right or wrong. And sometimes in-between. These are mental qualities that I have chosen to have; that guide my actions. It seems like character also involves having a bit of backbone. It means standing up to someone or something when you don't agree. It means speaking out even when it is against the flow. I think that requires character. It is important to me and I also want to find it in people I respect."

I can't imagine a better way of defining character. Thanks Mary. We added some things that we think are essential human qualities that need support in our education programs. Let's continue with compassion. Ben, want to take a shot at it? How have you experienced compassion?

"Doc, I had a lot of thoughts when we discussed EQ. I don't really have a good way of understanding or talking about the emotions I feel like pity, suffering, or depression. These

feelings make me sad, and maybe even a bit nervous, but I'm working on how to deal with them. Where does this compassion for other human beings come from? Do you think compassion is learned? Can it be taught? I see people all the time who don't care about the difficult times other human beings are having, especially people fleeing the horror of war. Sometimes I listen to people in positions of power talk about others like they were expendable objects; not real, feeling, individuals and families. Don't people who have an under-developed EQ do a lot of damage?"

Ben, 'selfish' is a common way of describing people without a developed EQ. I think compassion can be taught, but for most of us, it is learned as we get out of ourselves and understand what is happening to others. That can be modeled in our families, in our schools, with friends and in our communities. Involving students in a project that helps others in tough situations can break down fears and misconceptions; it points out the common bonds of our humanity that override cultural and economic differences.

That gives us a good starting place for compassion. Next is self-directed learning. Mary?

"I had one project in social studies. It wasn't totally self-directed because the teacher gave me the topic and the assignment. He did let me do independent research in the library, but really, I could have stayed at home and accessed the information I needed on the internet. I could have used my word processing program to create my report and it would have been faster. It didn't require any comparative thinking or analysis. I just regurgitated what I had found. I wasn't that interested in the topic and my mind wasn't hooked-in so I didn't learn or retain very much. It did teach me how to create a research paper and that has been valuable. I wouldn't say it was really self-directed learning though. The closest I experienced was a long time ago, in my Montessori preschool where we were allowed to progress at our own rate based on mastery of each skill unit. It's still not quite the same.

Your class is my first experience with being challenged to direct myself, even though Doc, you are still guiding us and setting many of the parameters. I do feel closer to being more completely self-directed . . . I feel more in charge of my learning. I am building con-

fidence in my instincts; I am finding my voice."

You are right, Mary. Being self-directed is more than being on your own. There are always parameters set by others or those you set for yourself—limits and extents to your focus that keep you on task. The social studies class you describe had set outcomes with expected answers and results. It was designed as a closed system to teach pre-established competencies, not as an individualized, self-directed path, designed around the needs of each student.

Are we ready to move on to problem-solving? Frank? Can you give it a try?

"I want to follow-up on George's understanding of how we find solutions to difficult or complex issues. We identified some of this process when he talked about critical thinking. I use critical thinking to go deeper, because I want answers; I want solutions to problems. I see this as a way to sort out and understand that there may be many solutions and that one must have a reliable process for examining options and selecting the one or two that are most applicable. It is a thought process that lets one explore other viewpoints and weigh

other opinions. I have learned that facts don't lie. However, facts change with different data and perspectives. We are constantly confronted with situations every day that require problem-solving strategies; sometimes the variables are not black and white."

Thanks Frank. Problem-solving and critical thinking do go hand-in-hand. I hope we can talk about this more in depth later in our discussions. Let's move on to passion. Annie, I recall you added this to the list, what are your thoughts?

"I think enthusiasm is passion. I mean, it is when there is something that you feel so strongly about, love is just one example, that you want to keep focusing on it all the time. I'm like that with my music. My Mom is like that with her gardening. If someone does not feel passionate about learning, work, or life, then that is an indicator that they are not engaged; their head and heart are not fully aligned; they aren't doing well. Our experiences at school and with education should generate passion; they should help us discover and nurture it. In my mind, that is the key to accelerating learning. If passion is squelched,

there is something wrong with the school or the individual. Right now, I'm pretty sure that something wrong is with the schools."

I agree, Annie. You all are certainly exciting my passion for teaching. How is everyone doing? We've covered a lot so far. Should we call it a night and meet-up tomorrow to finish?

"Sounds good, Doc. That will give us a little more time to think about all of this."

Chapter 9

AI has the potential to vastly change the way that humans interact, not only with the digital world, but also with each other.

Okay everyone, we have the last three items on our list and anything more that you might want to add. What would you say about social skills?

"We are learning to work together in this class as we try to identify the skills people will need in the future. I've worked on a few group projects in school but a lot of times only one or two people do all the work."

"Right, George. I usually hate group work for that reason."

"I had an experience this weekend that relates to a lack of social skills. I went to a folk festival to hear some really great singer-songwriters. Right in the middle of the perfor-

mance, there was a group of people that started talking loudly to each other, disturbing everybody around them, and then they got up and left. They were totally disruptive and rude. When I was in elementary school, we had assemblies and entertainment in the gym. Our teachers taught us how to act respectfully and not be rude—how to wait until a break to get up and leave, even if we had to go to the john."

"It just reaffirms what we said about schools needing to teach social skills too. I guess those people failed the test."

"So, are we talking about skills we use with other people, or the process of becoming 'socialized'? In the old days, didn't schools exist to socialize and 'Americanize' kids from many cultures, languages, and ideologies? One time, my mom did a paper in a class that looked at how America became one nation and not a jumble of conflicting cultures. She went clear back to early pioneers like Horace Mann.

When she was in school, her family moved a lot from state to state. She said wherever they went, and they even went to Alaska once, that what they taught in the public schools, and the grade they taught it in, were almost the same; one second grade

classroom was pretty interchangeable with another. America was united as a result."

"Maybe there is a difference between a standardized public education system and a standardized student that is stamped out of a cookie cutter mold."

"Mary, in my experience, standardized education is a lost cause. We moved last year and my sophomore classes had totally different curriculums. Several of my elective courses didn't even transfer. What gives?"

"Mom thinks it was segregation. A number of people, too many really, believe people of color are intellectually inferior. They are taught that all their lives; even in their churches. So, they organized and fought for separate schools for their kids—schools that are segregated—most important, schools that broke away from teaching for 'One America'. The result was social segregation based on skin color and economics."

"This is all very interesting, but what does all this have to do with AI and social skills? Come to think of it, I really don't think I understand what AI is and how it connects. Are we all talking about the same thing?"

"Okay, it's time for Wikipedia. I found this definition from the Internet Society. Let's see if there is a connection."

> Artificial intelligence is a technology that is already impacting how users interact with, and are affected by, the internet. AI has the potential to vastly change the way that humans interact, not only with the digital world, but also with each other, through their work and through other socio-economic institutions—for better or for worse.
>
> AI traditionally refers to an artificial creation of human-like intelligence that can learn, reason, plan, perceive, or process natural language. These traits allow AI to bring immense socio-economic opportunities, while also posing ethical and socio-economic challenges.

"I just read through some more internet recommendations. It's amazing really what you can find when you go hunting; There are so many resources. This one really got my attention."

> Humans must be in control: Any autonomous system must allow for a human to interrupt an activity or shutdown the system—an 'off-switch'. There may also be a need to incorporate human checks on new decision-making strategies in AI system design, especially where the risk to human life and safety is great.

"Hey all, did you all catch that . . . AI could change the way humans interact . . . with each other? That means that AI could see groups like ours as a threat, and organize other groups against us, especially if groups like ours want to limit the use of AI. We're not the only ones worried about how to keep humans in control of the process and not some algorithm based on soulless data."

"This idea of socialization is already a kind of programming isn't it? That is part of what schools are supposed to do; and our families. We have to be taught social skills in order to function in our society and live cooperatively. Education programs must teach us how to work together as a team. I don't think computer-driven machines, even with complex algorithms, can be taught social skills."

Okay, back to Google and Wikipedia.

Social skills are the skills we use to communicate and interact with each other, both verbally and non-verbally, through gestures, body language and our personal appearance. Human beings are sociable creatures and we have developed many ways to communicate messages, thoughts, and feelings with others.

A social skill is any competence facilitating interaction and communication with others where social rules and relations are created, communicated, and changed in verbal and nonverbal ways. The process of learning these skills is called socialization.

Social skills are the ways we interact with others. If we have good social skills then this can help us become confident, happy people who are easy to get along with.

Social skills: Respect for yourself. Participation. Friendship skills.

"Humm . . . non-verbal communication. Can AI do that appropriately? Avatars can gesture but I think it is still controlled by the end-user; they are just an elaborate interface. From what I have read, computers don't need, or experience, friendship. They don't respect themselves. They don't need to interact with others; they can be joined through a network. They don't have thoughts and feelings. Maybe this fear that they will replace us with data that says human interaction is inefficient and is nothing they need, is irrational? I guess computers don't experience fear either now that I think about it."

"Consider this, Claire, computers are color blind. Humans are not. Obviously, humans need social skills to work together, and our species has succeeded because we do work together. But I see where AI would consider these needs our greatest weakness; maybe they just get in the way."

Is it possible that our strongest qualities could actually end our species? Here we are. In just a few campfires and with access to information, we have moved from a group of isolated individuals to a pretty cohesive group. I imagine that our earliest

ancestors did the same thing around campfires. They worked together to survive. That ability to interact and go forward, the ability we have rediscovered here, is what made sapiens survivors. Now, machine intelligence may see that as our greatest weakness, our need to rely on someone else to succeed, instead of being self-contained. Machines don't need social skills to interact with others—maybe data sharing—but that is not friendship and collective human intelligence. Problem-solving efficiencies are enhanced in the human species through the clan, and in computers through networking to other machines that can run or accelerate different types of data processing.

"It's like we link our mental computers together to arrange and rearrange data to fit the challenges we face. It is more adaptive and definitely different."

"So, Claire, are you saying that our human computers, our brains, are better than AI's computers?"

"Different for sure, Frank. But are they better? Haven't we been talking about the reasons why humans should control computers? Meat vs. machine. Now we're saying that we should survive and lead because our species

has strengths that are broader than data-driven machines? Is that right? Tie all computers together so they have machine think. Put humans together so that we have collective human intelligence. Now which group will be flexible enough to survive?"

"Data equals data, and AI has algorithms to solve problems and maybe generate new data. They certainly will be faster, Claire."

"Human design teams gather and use machine intelligence to solve problems to create and innovate. So, do human minds gather and use data in ways machine 'minds' can't? Do you guys think we have the upper hand because we can use machine intelligence to meet our objectives?"

"At what point do humans need to worry about being replaced or retired from service?"

"Ben, you mean you would accept AI's very valid, data-based conclusions that humans are no longer necessary?"

"I, for one, am not willing to accept that. I think we will coexist; it is not either or. I love my devices, and my access to the internet. Technology makes many things in my

life easier. That doesn't make me expendable. We are beginning to understand the strengths of AI and we are exploring the unique strengths of human beings. In my mind, we will continue to evolve together. We just need to keep those devious, greedy, control freaks away from the development of the AI programming. Besides, I think that the same creativity we have talked about will lead to the creation of AI programs that will offset the development of technology that works against the health and well-being of the human race.''

Well said, Ben. Are we ready to tackle negotiation and networking? We already network computers very effectively, but I think we are talking about how that differs from the way human beings network and negotiate. Sometimes I use the term 'net-weaving', it provides a more graphic mindset.

''People do weave nets that interconnect them with others. Computers can be linked to transfer data and share applications. Negotiation and networking on the human side doesn't seem to be quite so quantifiable; it involves more of the EQ we were talking about before.''

"I agree George. We maintain networks through ongoing communication; sharing pictures and messages on social media, sending email, sharing experiences; through conversation or writing books and telling stories; it is very social. We aren't linked in a series; we really do weave nets that connect us.

"I'm not sure computers can actually negotiate. Could an artificial intelligence negotiate a peace settlement? Can it take into account various opinions cultural differences, and build consensus?"

"Let's check and see what our old friend Wikipedia has to offer."

> A strategic negotiation involves: Setting goals, objectives and boundaries. Understanding the declared incentives within the goals in context. Rationalizing the range of mutual agreement without losing cool and maintaining mutual respect.
>
> The foundations of negotiation theory are decision analysis, behavioral decision making, game theory, and negotiation analysis.

"Computers and AI can do all that, George."

"Goals, objectives, and boundaries are things both computers and humans can do. Goals? How do computers set goals?"

"Easy, the same way we do. We know what we have to do and set up a step-by-step system to get there."

"But George, where I'm hung-up is where is, 'there'? Who sets the goal? Who determines the who, what, where of there? Can machine intelligence set goals and design pathways to a place that they, through their analysis of data and algorithms driving AI, determine where in the future they are going? I think what we need to know is why we humans can do that and why computers may not be able to. And what about the give and take of negotiations; reading the needs and intentions of the negotiating parties?"

"Well, Dan, machines can certainly stay cool, in the sense that they are not emotional. But mutual respect is not a computer thing. Data is data, and the question of respect can't be factored into machine programming. That would be a human judgement issue, and not

something needed for operational efficiency. Behavioral decision-making, if I understand it, is not a computer thing."

"So, what we can conclude is that mankind's strength is deciding where we are going, why we are going there, and responding to the surprises that come with exploration of the unknown. Computer data is definitely an important tool to help us get there."

Okay. Reviewing our list, we have one item left. Anyone game to take it on? George? I thought 'non-culture specific,' might appeal to you.

"We are all human beings. Even though we populate very different regions of the globe, there are more aspects of life that we share, than those that divide us. And the differences between us are worth celebrating in my mind, but that is a different topic. As we talk about the future of our species, I know in my heart of hearts that eventually, all eight billion souls on Earth, will be affected by AI; by the ongoing and increasing manipulation, data gathering, and pattern recognition of machine systems. My hope is that whatever we come up with, we will help prepare and protect human beings

everywhere on our planet. That is what we are trying to do; to enhance the quality of life for all of mankind and future generations. Just a simple little challenge."

We made it! I think we should call it a night. We have accomplished a lot around this evening's campfire! You've given some great definition to our list of the human qualities that an education system of the future should encourage and develop in order to work with, control, and combat the misuse of AI as it gains predominance in our lives. At our next campfire, we will continue to translate that into the nuts and bolts of an education system for the future.

Chapter 10

Somehow, we have to change the direction of our military-industrial complex and redirect funds to infrastructure and education.

"Doc, I have been thinking about our list. As I recall, we are building our school of the future based on qualities that all humans have. Our goal is to live happily ever after and keep the bad guys in check. But isn't war and rivalry over territory and resources a natural part of being human? I don't think we want to encourage that, do we? I bet AI would have a pretty different take on war. Machine intelligence, for example, might conclude that war should be eradicated because it is totally destructive and a waste of good resources. Maybe war, not AI, is one of the major reasons our species should not continue; maybe we wipe each other out."

I agree, George, war is a total waste of physical resources and human life. Warfare is a giant industry driven by fear and those who can turn us against our neighbors. Every aspect of war is terror, evil, and waste. Yet, we are a species that can't seem to control itself; we use war and hate to destroy the environment, resources, and others. We are constantly putting the values of our military-industrial complex before the lives of our fellow humans.

"If there is any area where I agree that machine Intelligence should defeat humans, it is mankind's propensity for war. Just in the U.S. alone, since 9/11, we have spent over 600 trillion dollars on war and killed over 500,000 human beings. Did you know that we are currently bombing nine different countries at this very moment? Yes, I Googled it. The schools we need must identify this terrible part of man's nature and help those of us who will live in the future to stop war."

"Maybe AI and medical engineering can improve the human species by altering the genes that respond to war. We are already treating viruses that attack us, like chicken pox and measles. How about creating vaccines or

forms of quarantine that stop those infected with the war disease? We were thinking back through history. What if some intelligence could have identified the leaders who used xenophobia, fear, racism, nationalism, and our greed to create wars, and then altered or removed them?"

"Genetic engineering is a bit scary to think about, George, but I bet we all agree, that getting rid of war would be a positive improvement for the ongoing well-being of our species."

"This is really starting to sound like every dystopian movie we have ever seen—bad outcomes with good intentions. I think we need to work on some of those inherently human qualities on our list like compassion, and communication to offset fear-mongering and aggression."

"Mary, I think you are dreaming if you think that will work. Bob, I think the military-industrial complex has evolved way beyond keeping us safe. It is a sickness that grows and grows as it amasses greater wealth. It has its own destructive momentum. We know robots and drones are already replacing human soldiers. Maybe that is a good thing, except for

all the innocent people caught in the crossfire. What would a data-gathering and analyzing algorithm conclude?"

"Like we said, that man makes the wrong decisions. Humans waste their energy and resources in the conduct of war. War is the enemy of mankind's future and the reason AI will conclude that war is an inefficient waste of resources. You feel that way too, don't you George?"

"I've been searching the web and driving bots crazy. In the past 70,000 years, there are definitely times when sapiens have fought to defend themselves from enslavement and annihilation. But really not since WWII, has America gone to war to protect our home-land—the U.S.A. So many other wars had to do with a desire to expand territory and acquire someone else's resources. When we say, 'war', the concept has very little to do with survival. We pretend that our soldiers die to keep us free, but their deaths have little to do with protecting our home turf. Protecting yourself, your family, your land and your homeland is one thing; that is a human survival instinct as old as mankind; a basic human need. But since the late 1940s we have

approached war differently. War has become a money machine; an antidote to a sluggish economy. It is a way for the few to gain wealth, power and control of resources, and a way to keep us distracted in difficult economic times."

"Geez, George. I knew you were a war buff, but what you say rings true. Somehow, it seems wrong that we always have lots of money for our military and never enough funds for infrastructure, education, and scientific research. Those trillions of dollars could be redirected to improve education and peoples' lives rather than destroying them. Artificial intelligence might actually be an ally in this process by finding ways to reallocate resources for the improved health and well-being of our species. AI might actually analyze war from an efficiency point of view and determine it is a very big waste of human, physical, and economic resources. Maybe the data will actually be persuasive, and help politicians reverse course."

"Wouldn't that be great! But depending on who is running the programs, AI could just as easily be used to destroy resistance to the military machine."

That's why future citizens have to be raised on the skills we have identified; to make choices that value human life and respect other cultures.

Chapter 11

Always before, when people designed education systems, getting facts was thought to be the only way to progress.

"Doc, you mentioned the uproar a calculator caused years ago. People must have been sure that would lead to the end of a student's ability to do math. Then along came the hand-held computer, the iPhone, and the technology that gave us access to immediate information. Now, instead of going to the library and searching the card catalog for books that might have the information we need, we can use search engines to do the work with more depth and efficiency. Some are asking if using that easily accessible information instead of trying to memorize a bunch of facts is less valuable; is dumbing us down somehow. I don't get it. Why should I waste time trying to store

it in my head when I can find it so quickly with the internet? Of course, finding the information is important, but mostly, what we need are the skills necessary to evaluate the information we find and check its accuracy. We need to synthesize and apply what we are learning."

"Don't you agree, George? If I had a way to be more efficient about how I access information, why wouldn't I use it? I know I need a variety of verifiable sources to make sure the info I get from the internet is valid; to evaluate bias."

"I agree. The main way teachers test our understanding is to measure the memorized facts we retain in our heads; what we recall. Just because somebody can't memorize as easily as someone else doesn't mean they don't understand the concepts.

The most effective testing would measure mastery; what we can do with that information. It goes back to that idea of formative assessment we were talking about before. That is how learning ought to be measured, but I have never had that kind of test. I took a pre-SAT to see what it was like. They want to know if I have the formulas in

my head and can apply them. Or, they give me the formula, and if I don't use the formula right, I get the question wrong. What good is that?

In the future, now, in fact, I can solve many problems by using a device to make the calculations. The important thing is whether I know how and where to apply it. The device is just a tool . . . well, like a hammer to drive a nail. I could use a rock I suppose, but a hammer is a lot more effective. It doesn't mean I don't understand how it works. I never do that well on data-driven tests. Multiple-choice tests are the worst. I don't think I am stupid, after what we talked about at the last campfire, I think it means I'm a self-directed learner with a different learning style; how and what I learn is not what they measure. What do you think, Dan?"

"What the tests actually do is destroy diversity. When I was searching for more info about testing, up popped a lady whose name sounded familiar, but I didn't know nothing about her. I clicked on the link to Diane Ravitch, and her work blew me away. I'll text you the links to her blogs and the books she has written. She is definitely worth checking out.

Through her, I also found a link to a YouTube presentation by an amazing Chinese-American educator, Yong Zhao. I wasn't going to spend any time viewing it, but I got hooked. One of the ideas he put in my mind, Doc, was the fact that American schools are killing diversity through the reliance on standardized tests. Diversity is one of our greatest strengths! Why would we do that?

It seems like when you talked about the concept of 'One America', it meant that the structure of public education was standardized across the entire country, to help people from many cultures work together and share common understandings but that didn't mean the elimination of diversity. Dr. Zhao talked about how countries standardized their populations by forcing them to learn to the tests. The system was designed for uniformity; to make them all think alike. Sounds a little like brain-washing to me. Seriously guys, you've got to check out these two amazing resources. We need to know a lot more about them. I'm going to keep on digging.''

Dan, are we talking about what we need to teach or the how?

"Both. In the future, a student will not need to have a head full of facts to pass standardized tests, or know a certain formula. Testing will tell her if she can access the facts and the correct formula to solve problems. I agree with George. Getting information should not be in the way of going ahead and doing a task—even a complicated task like building a city on Mars. What do you think Bob?"

"Always before, when people designed the curricula, getting facts was thought to be the only way to progress. Books and memorization were the tools. Having the right tools is important, but the tools have changed. A self-directed learner uses the best tools available to solve problems. I think what we are looking for is 'why' the individual or group is working to solve a problem. Why they pick up a hammer . . . what motivates them. What motivates them, Claire?"

"I also agree. Learners are motivated to solve problems or create new things. They are not held back by lack of information. They are not held back by their own ignorance. They use tools like cavemen used tools, to do what they want to do. The tools are readily available, and it is their creativity and purpose that lets them

get the job done. Having access to information is not a problem that future students will have to deal with—sorting fact from fiction will be more of an issue. Now losing power without a backup, that could be an issue. But we are nearing a place where individuals all over the planet will have the use of solar and wind power to maintain access to systems.''

So, what will motivate students in the future? Should we still assume that schools are training students for the work force? Will you be driven by the search for food, clothing, shelter? Survival because a wolf is at the door? Or . . .?

''Doc, it's probably something in the human species, something that evolved and made us what we are. Is it curiosity? I just can't imagine computers with AI having it. How could computers have that? What's that you want to add, Claire?''

''My grandma used to say that if poor people got hungry enough, they would work to change things. I thought that must be true until I thought about it. If you are hungry and threatened, and too weak, and too tired to think clearly, you are in no position to change things. This reminds me of our discussion of

compassion, citizenship, and problem-solving. But, look at us . . . we have all of our physical needs met. There is no wolf at the door. There is an abundant amount of free time. In that free time, we either choose to sleep, stay drugged out, or we get into things, we self-direct, explore, think, dream, and play. If we were in classes being force-fed information, or in the library struggling to find a book that may have an answer to our questions, we would not be using our time well. Don't you agree Mary?"

"We can't let information-gathering be the focus, not the tool. If the reports are correct and data-gathering devices will provide information about us—what we do, buy, and possibly even think and feel, and that AI will take that information and make decisions for us, we have to be prepared to deal with it. To counter these major changes in the structure of our society, this invasion of technology into our lives, we humans have to become skilled at accessing, analyzing, and using the data we need. To enjoy the benefits and be prepared for the challenges. Think about what is already happening to the work force as the use of robotics becomes more

commonplace. Jobs are changing. Factories are changing. We need to maximize our ability to use data to do the things that our future demands."

"Mary, it sounds like we just came full circle; we are back to our initial idea that we have to identify and develop those skills that are particularly unique to human beings to prepare students to utilize these strengths to achieve balance and success in a world served by technology."

"Yes. We have to do what machine intelligence cannot do. We have to be prepared for anything, even moving into space, or, meeting other forms of intelligent life. What if there are breakthroughs in tapping into animal thoughts? What if we can know what our pets are thinking? What if we come to understand the anguished thoughts of pigs entering a slaughter house? Remember empathy? We have to stay open and flexible. Standardized, controlled thinking is for computers, not human beings. Creativity is our strength.

We need a world where we have data and AI, and we use them as tools to grow and develop our species. We need our EQ to balance the IQ of machine intelligence."

This is wonderful, Mary.

"We have to prepare for myriads of unimaginable outcomes and scenarios and not limit them to what we think now, or what compounded data determines. We have to have schools that function on analytical reasoning, problem-solving and those old human strengths of teamwork and cooperation. We need ways to think beyond data and into the future. What's your take, Bob?"

"People definitely need to have built-in 'crap detectors' to evaluate the waves of information that will be coming at us all the time. Already is. There will be limits to AI, and the data it can produce. We need people who can think both independently and interdependently."

"Think? Everybody thinks. What do you mean, Bob?"

"I 'think' it is a process of analysis and not memorization or assumptions. These are skills that are not content or knowledge-based. These are ways of processing information that are not bound by collected data. Dan, you have been laying out of this conversation. What's on your mind?"

"It seems in some ways the human brain is like a complicated computer. It crunches a lot of information every day . . . and night. Then, we have our minds. I am not sure they are the same thing. Maybe our mind contains all the qualities we are identifying. If that's so, education must enhance and develop the mind as well as the brain."

Wow, that distinction is an amazing insight, Dan. You are right, we know almost nothing about our minds. But we should know a lot since we are thinking constantly. We just never talk about a difference between the two. It seems that based on what you are saying, AI is like our brain, and works on data; the part we call our mind uses this data and makes us human.

"Brain, mind? I need time to digest that concept. I really want to learn more, but getting back to thinking—when I asked a politician about why they were cutting art, humanities, music, you know, even jewelry-making, he said those things didn't help you succeed. We know that isn't true. Those courses are super important. They stimulate creativity and innovation, the very things we will need

most in the future. That guy has power, but not insight. He is a dinosaur that needs to go extinct.''

''Right. There are lots of petrified intellects who think that way. For our future, we have to think analytically and critically through an understanding, not only of basic foundation skills, but to know how to use information to creatively solve new problems and push into and through the unknown. The arts are all about that.''

''When we say schools have to teach analytical critical thinking, what do we really mean? How in blazes do we get teachers to do that? Someone Google it. Let's see what Wikipedia has to offer.''

> Analytical skills refer to the ability to collect and analyze information, problem-solve, and make decisions. These strengths can help solve a company's problems and improve upon its overall productivity and success.
>
> Analytical skill is defined as the ability to visualize, articulate, conceptualize, or solve both complex and uncomplicated

problems by making decisions that are sensible given the available information.

"Humm . . . decisions that are 'sensible'. What exactly does that mean? It sounds pretty subjective to me."

"Hold on guys. It seems like only half of us are participating and doing all the work. We can't be a real team if all of us aren't involved. What gives, Steve?"

"Well you are right, Mary. I am thinking about it, but it is a lot to consider. I'm not even sure why we are doing all of this . . . I mean you lost me at 'hello', if you know what I mean. I'll graduate soon, and I don't really see how this affects me, or what I can do about it. I guess I don't really buy-in to the idea of working to change a system I am leaving."

"I agree. I haven't participated because I started out thinking like Steve, wondering how I fit in and what difference any of this makes to me. But after one of our campfire conversations, the night was so balmy and beautiful, I just rolled my bag out to sleep under the stars. I felt like I was alone. I was staring at the heavens and thinking about being made of stardust.

I may have dozed off. I had a vivid dream. I was floating and looking down at a tombstone. The ghost of a very old woman was standing next to it. The woman was me and the tombstone had a R.I.P. on it with my name! It had the dates b. 2003. d. 2101. It made me realize that I was going to live most of my life in the future and I needed to prepare for that, not be focused on my now. It really hit me hard and I have a lot of catching up to do.''

''I like that image, Sarah. Why don't we all imagine standing by our graves and looking at our tombstones. Gives me the shivers, but it does help put things into perspective.''

I'm glad Steve and Sarah had a chance to talk about where they were coming from. I think we need to break here. We can meet-up again on Sunday night.

Chapter 12

Is that the process people have to go through to draw conclusions; they have to test whether the statements are based on true facts and then apply them to the situation in question?

We've made a good start identifying human qualities that computers don't have. Our next challenge is to determine how to integrate them into the school structure. Where should we start? Preschool? Elementary, middle, or high school?

"If we are having a hard time with this, imagine what other kids our age and adults will struggle with. What do teachers and parents have to do to get kids to identify patterns within information, to use deductive reasoning, recognize logically equivalent statements, and infer what could be true, or must be true, from given facts and rules?"

"You remembered all that Annie?"

"No, I took good notes on my phone and am using them. I can't imagine doing those things, let alone trying to teach it to a first-grader. Maybe we can't start teaching analytical thinking in elementary school."

"I think we can. We just aren't used to thinking like a seven-year old. We would have to simplify our language and our examples. I think a first-grade kid can understand that Rex the dog is brown. That's true. But she can also find a false statement. Rex the Dog flies airplanes. She can also get several unimplied meanings. For example, Rex is someone's dog, or Rex is a dog, and dogs belong to people . . . know what I mean?"

"Oh, like Dean's dad is a firefighter, and he works in a hospital. The kid has to decide if the dad is a firefighter, would he normally work in a hospital. Do EMTs do both? Fred's father works in a hospital, but he is not a firefighter. The kid knows he needs more information about Dean's dad. Dean explains that his dad works in a firehouse, not a hospital. The circle is closed, and the kid has separated out a fact and knows the first statement is false."

"Is that like a kind of logic? Is it critical thinking? We were just starting to talk about analytical skills at our last meeting. Is that the process people have to go through to draw conclusions, they have to test whether the statements are based on true facts and then apply them to the situation in question? Then teachers can design exercises that teach us how to make valid decisions. I like that! Mary, you want to add something."

"I think this story is in line with the need for the type of analytical thinking we are identifying. Listen, tell me what you think.

Ferd McDuck is running for political office. He is really good at public speaking, and he looks like a successful man. He states that there is a conspiracy to keep him from representing our interests, which he says he is fighting for.

His opponent says that he really does not support our community; he is using dark money to buy the election; and he accuses him of really representing Betsy the Oligarch whose political group wants to use public funding for private gain.

Ferd claims he supports our community schools and is at the forefront of a fight to

fund schools. His opponent quotes Ferd as saying, 'Public education is a sham.' He points out Ferd has voted five times to cut school funding. The campaign gets pretty heated and ugly.

Ferd has won the support of the Always Right Religious Coalition. He claims he will win because his supporters always vote for his party. He has the most yard signs and buys the most advertising. He now leads in the polls. His opponent says truth will win out.

How do we decide who is telling the truth? Most people are so disgusted they won't vote. Will most voters take time to analyze the data or will they just vote along party lines? Voting is one of our most fundamental rights and yet, the percentage of people that actually vote is low. Those few that do vote will rule. Does that mean they represent the will of the majority of the people, or just the majority of voters?"

"Good grief! Did you just make all that up, Mary?"

"Not really. I've been involved in the current election. These are real issues I've been dealing with. I can tell you, I was not prepared

by any of my classes to analyze and sort out the facts from this level of fiction. No one I know was. Shouldn't we learn to think and analyze—maybe in social studies or civics classes? If we debated and investigated actual current events, we would be prepared to exercise our right to vote in an educated way. I know we can start teaching this way of thinking in the early grades too. These skills are as important, maybe more important, than . . . memorizing a list of Presidents.''

It looks like we have time to tackle another issue. Anyone game?

''I have to have time to let my alpha waves sort all of this information in my mind. I can let it sort and consider another issue if it's simple.''

''Nothing ain't simple, Mary. What needs our collective intelligence this time?''

''I've been thinking about what George described when we talked about that one item 'not culturally specific'. So, how does what we are looking at match up with other cultures and other intelligences? I don't think I have a good understanding of this. Why the groans?''

"Simple," we said! In fact, I don't think we can get deeper into this without a lot of information about . . . well, about what can work for others. What they will buy into."

"This is a true test then. We have access to information and we know how to get it . . . let's at least gather enough information to discuss it."

"I don't like this part. We have to know our own culture before we can go trotting off to decide what's best for other groups of people that we know nothing about."

"True, Bob, but there must be typical—I think the word is archetypical—cultural things we can agree on. In fact, I know we can list some things humans everywhere need like food, clothing, shelter, companionship and community. Things like survival, teamwork and differentiated roles; love and parenthood values. Outside of all our material 'stuff', we are not so different than people living deep in the Amazon. But we are different than even the most capable computers. They don't need what we need."

"Yes, but our advanced cultures kill over 1.3 million people a year in automobile accidents. That's probably a higher percentage of

deaths than those who die of snake bite or being attacked by a rabid lion in the jungle. Survival is a universal concern. The threats may be different, but the concept is universal. And think of those who are trapped by war. They definitely understand threats to their survival and the need to end them."

"We do have problems, Annie. I'm concerned. The history of our species is so complex that I don't think I will ever understand it. I watched a PBS television series called, *Civilizations*. I was amazed by the role creative expression played in the history of other times and cultures. We could spend our lifetimes trying to understand what came before. Each civilization made amazing advances and that is represented in their art. I became aware that most humans who lived in those times were—well, they were often used as slaves completing projects orchestrated by some small group in power. I caught the truth that individuals didn't matter, except as workers or soldiers. It reminded me of that first discussion we had about the deer and the herd. What bothers me most is that the AI-driven machine age ahead of us could be no different. What do you think, Frank?"

"I think the majority of humans have always been controlled. Maybe for the first time in history, We the People have been given some power over our individual lives."

"If that is the case, we aren't doing such a great job. Look at politics. Look at the rulings of the politicized Supreme Court. Look at right to work laws. Look at the power of the wealthy one percent. Aren't we still a majority controlled by a small minority? I think our culture is losing whatever it is that lets individuals determine the course of civilization . . . if we ever had it."

"So, Bob, you think we trade one master for another?"

"Maybe. But through technology, we might have created a master that can do quite well without us. Laborers? Warriors? In time, robots will do many of these types of jobs better than man. War doesn't make sense anyway. It is a terrible waste of human life and resources. Computers do not need slaves to build pyramids and cathedrals."

"Okay, Bob, everyone, a look at human history does indicate that a few powerful humans, either religious leaders, dictators, kings, or elected leaders, used the masses,

organized them, and led them. They often killed many of them, but that is human history on planet Earth. Maybe war and conquest are in our genes, but I doubt it. I think we can eventually move beyond them. Our quest now is to identify qualities in humans that can help them lead, and control, the rise of AI. Remember, we are trying to determine the skills that students will need to learn in our school of the future.''

''I know, I know. Let's stay on track. I'm sure we could find many examples of the qualities that we have identified in our past, as well as our present. We have identified some very important ones that seem to be universal.''

''Ben, let's see if we can determine if AI and machines have some of the qualities on our list. As far as we know now, computers don't possess these qualities. We were just talking about the role of art and creative imagination in civilizations, let's check out creativity. Can a computer create a work of art? Do a search on Google for creativity.''

> To be creative a person or group makes something new and useful.

"Okay, here goes. We ask a computer to make a work of art like Rodin's sculpture, The Thinker. Does the computer analyze data and present something new, useful, and valuable? Is the process the same as the one a human might use?"

"Good start, Bob. Humans study art. The computer analyzes data about the physical characteristics of an artwork. We appreciate new combinations of material—clay, steel, or charcoal on paper. The computer just does the same thing, only it has access to much more information about the composition of the materials. The human forms a picture in her mind based on cumulative experience and works the material in ways that represent both her idea and the feelings she wants to evoke in the viewer. I'm not sure a computer takes that interactive part into account. A computer can definitely generate many forms and combinations; it can create many new variations on pre-programmed patterns. I don't think it is capable of insight, personal expression, emotion, and spontaneity; many of the human components that contribute to works of art. By Wikipedia's definition, the computer can definitely create new combi-

nations, but I'm not sure that is what makes a compelling work of art that engages and moves the viewer. It is missing the EQ portion that people need."

"So, Claire, what about critical thinking. I assumed I knew this but . . . back to Wikipedia."

> Critical thinking: 'Thinking about thinking.' It is a way of deciding if a claim is true, false, or sometimes true and sometimes false, or partly true and partly false.

"Uh . . . that's confusing. I think computers are good at this, like running proofs to see if something meets certain established criteria. Do we assume that humanity can do this and AI can't? Reading down the list from Wikipedia, I can tell you that a computer can do most of these things."

> 1. Analyzing: Separating or breaking a whole into parts to discover their nature, function and relationships. 'I studied it piece by piece.' 'I sorted things out.'
>
> 2. Applying Standards: Judging according to established personal, professional,

or social rules or criteria. 'I judged it according to . . .'

3. Discriminating: Recognizing differences and similarities among things or situations and distinguishing carefully as to category or rank. 'I rank ordered the various . . .' 'I grouped things together.'

4. Information Seeking: Searching for evidence, facts, or knowledge by identifying relevant sources and gathering objective, subjective, historical, and current data from those sources. 'I knew I needed to lookup/study . . .' 'I kept searching for data.'

5. Logical Reasoning: Drawing inferences or conclusions that are supported in or justified by evidence. 'I deduced from the information that . . .'

6. Predicting: Envisioning a plan and its consequences. 'I envisioned the outcome would be . . .' 'I was prepared for . . .'

7. Transforming Knowledge: Changing or converting the condition, nature, form, or function of concepts among contexts. 'I

> improved on the basics by . . .' 'I wondered if that would fit the situation of . . .?'

"Okay, team, can we conclude that even though AI and humans can both do these things, humans still need to hone and develop their critical thinking skills to respond to unique situations, to make assessments of what they encounter, and how results apply to stated goals? Transforming knowledge doesn't seem to be a computer strength. I think we are learning to challenge and refine our assumptions. Maybe that is the very thing we are talking about."

"I think that's true, Frank. What about collaboration. Back to Wikipedia:"

> Collaboration is the process of two or more people or organizations working together to complete a task or achieve a goal.

"I wonder if computers could actually work together in that way, I mean actively collaborate, not just network in a series? Can they exchange data and revise conclusions in real time to accomplish tasks and goals? I think humans can work together and bring different

viewpoints to solving a problem, creating and innovating like we are doing; to reach a kind of consensus. This ability to incorporate diverse opinions may be our greatest strength. Can computers work as individuals and get together to share different viewpoints or conclusions? I really don't think they can. They have access to more data, but that data is sterile. I see it as a barrel of water when all you need is a drink."

"All the data, stacked end-to-end, is just a bridge to nowhere."

"Not true, Annie, that is where AI algorithms come in. Didn't we learn that AI has ways of applying data to manage systems?"

"So, what we are implying is that machine intelligence is data managed by AI with algorithms that it can design to connect computers, analyze it, rethink it, and draw new conclusions?"

"Anyone disagree? No? Then can we say humans are losing this round?"

"Based on our earlier discussions, this is not going the way I thought it would."

"What's next Bob?"

"Doc, has something to say to us."

What I've observed is that in our culture, anyone with an opinion can be listened to, and their opinion is taken just as seriously as the opinion of someone who has spent a lifetime studying the subject and has the data to prove what she is saying. A non-educator or self-called expert may have an opinion that is opposite to the great majority of researchers and practitioners who have data and experience to back them up. Yet, that loudmouth, especially with social media, may influence people and set policy. Human communication is often skewed and not accurate or useful. It can be more about power than facts and data.

If people use data generated by computers which analyze and fact-check statements and conclusions, then that is a way to make valid decisions. But more often than not, communication through regular human-to-human conversations is more about personal opinion than fact. Gossip, faulty memory, and power-positioning often rule.

I suggest we take a break over the weekend. This is pretty heavy-duty stuff to think about as we dig in deeper to the strengths and weaknesses of AI and humans. It is easy to get overwhelmed when we learn what a powerful tool data management and

collection is. Humanity has dealt with these issues before. The atom and hydrogen bombs still exist and terrify us, yet we have learned to put humanity before total destruction. Now, we have identified that humanity is at a tipping point. I think we all agree that we have to educate upcoming generations of humans to use their unique strengths to control AI for the betterment of humanity.

I do have one suggestion. Take a few hours to explore and reflect on what we know about our human ability to create. Take a look at Brunelleschi's dome in Florence and read about his process. Read about Hagia Sophia's dome and imagine the power of human creativity and imagination to do what had never been done before. Check out Anthemius of Tralles, and Isidore of Miletus.

"Who?"

Let your mind enjoy exploring our past to put what we are learning around these campfires into perspective. See you Monday evening.

Chapter 13

Claire, you must engage your mind. You must learn to think on your own, not just regurgitate information.

Welcome back. I have noticed we have been staying around the campfire later and later each time. Jo, how about a song to set the mood for us.

"Open Up Your Heart"

Open up your heart
Let a Stranger in
Open up your heart
Let a Stranger in
Open up your heart
Let a Stranger in
That's the best place to begin
Open up your heart
Let a Stranger in

Reach out your hand
To somebody new
Reach out your hand
Say 'Howdy-Do!'
Reach out your hand
To someone new
We're not so different me and you
Reach out your hand
To somebody new

I don't have to be right,
You don't have to be wrong
We can all believe
We can all belong
You don't have to be right
I don't have to be wrong
We can believe, we can get along
You don't have to be right
I don't have to be wrong

Set aside your sorrow
Set aside your pain
That bright tomorrow's
Gonna rise again
Set aside your sorrow
Your pain
Learn to love and laugh again

Set aside your sorrow
Set aside your pain

Open up your heart
Let a Stranger in
Open up your heart
Let a Stranger in
Open up your heart
Let a Stranger in
That's the best place to begin
Open up your heart
Let a Stranger in

Thanks Jo, that got us focused and ready to delve into very human abilities, thoughts, and perceptions of the world we live in. Did some of you have time to research the names I gave you? What affect did the works of these three men have on you?

"I thought, 'WOW,' these guys did this without any of the tools we have. No computers! They were brilliant! I know they had some basic mathematical skills, but I never imagined what it took to do projects this complicated. It took one hundred years to build the cathedral in Florence with the

assumption that someone would have the genius to figure out how to create such a massive dome. We would never do that today."

"I agree Frank. I always thought the twentieth century had the most advanced engineers and builders. I doubt that we would even begin projects like those today. We may know how, with their examples, but we could never amass the workers, the artisans, and most importantly, the will, to do it. We totally lack the persistence to complete a project that takes over a century. If I read the background info correctly, they didn't enslave their people either. Somehow, they sold the idea, and they trained workers to build the domes and buildings. All for the love of their God."

"I tried to think of how machine intelligence would do projects like these. Sure, calculations about how to build would be available, but these projects were not data-driven. They were part spiritual, part engineering, part creativity, and a lot of faith in human problem-solving. They came from the artist's imagination and experience. Man has these qualities; AI could calculate the loads, tolerances, and spans. It gets us back to our discussion of creativity and the arts."

"When you gave us this assignment—well, actually it was a suggestion—I had no idea that our past was so full of examples of how different we are from machines. But of course, this would be true, since machines have been evolving too. To Claire's point, there are spiritual elements in all of these magnificent works of pure creativity. I've never done much art, but I am beginning to understand more of the process . . . I mean, where it comes from and how it is expressed. I think machine intelligence can study all of the art in the world and all of the artists' techniques, but what AI produces would not be creative, or spiritual. I think it would be without passion; perfect, sterile, and cold."

"Doc, I have to say I objected to you asking us to do this on our time. I thought it would take days, and you were probably making a point or something. But I was so captivated by these dome builders that I could have spent all my time learning about them. Something happened when I looked at the pictures of their works and information flowed into my head. I read the intros about these guys and got enough information to understand some of their motivation. In the

future, I may have the time and inclination to really mine more deeply the data about them. But for now, I have an appreciation for their spirituality and how that opened them to creativity and risk-taking. Even more than that, I learned something about my mind, and probably how the human mind works. I learned that my mental computer can go beyond pure data and gain an understanding of the creative process. I took in more information in a few hours than I thought I could, and I am still processing it!''

Where are we with our goal of designing an education system for the future that enhances our ability to develop and utilize these skills? Bob, could you restate our list?

''We started with the 6 Cs of creativity, critical thinking, collaboration, communication, citizenship, character. Then we added: compassion, self-directed learning, problem-solving, assessing and analyzing information, passion, social skills, and, not culture-specific. Through our discussions, we seem to be adding spiritualism, artistic interpretation, imagination, free will, risk-taking, thinking beyond

pure data, accelerated learning, and I'll add, understanding, and comprehending."

Thanks, Bob, for the summary. That is a pretty substantial list of core skills. Let's focus on how can we structure our schools and assess a student's mastery of these skills. I think we should start by getting back to the idea of testing and the kinds of things summative testing is good for. Is it the end-all-be-all assessment tool it's held up to be?

"I agree, Doc, we talked earlier about the strengths and limitations of the 3 Rs; and the current obsession of so many reformer types with standardized testing. We know we need to be competent in reading, writing, and arithmetic a.k.a. math."

"In this global world, we should probably include languages, social studies, and . . . I think civics, probably as part of social studies. We are supposed to be informed citizens of a democracy after all. Right Annie?"

"I agree Bob, but are we talking about curriculum or evaluation? One is what we study and the other is how we know we have mastered it."

"Good point. But to begin with, let's limit our discussion to summative measurement. Can she do it? Has she passed the test? Is her progress appropriate for her age and the grade level she is in?"

"Yes, but we already decided that all of these areas must have a formative dimension to chart the growth and skill acquisition of each individual student. Kids learn at different rates. We know we don't all learn in the same way or on the same time schedule. Why use summative measurement at all?"

"So, if I understand this properly, summative measurement is norm-referenced. The assumption is that all third graders are at the same developmental level and will leave third grade with a fixed set of measurable skills. To know this, the tests are designed to identify those skills and evaluate each child's level of mastery. That score can also be used to evaluate the teacher and the school against national or international performance. It is a bit like quality control on the assembly line. Of course, that would assume that all students, teachers, and school environments are the same, which we know is impossible, especially around the entire world."

"But what if the child develops at a different rate; she needs more time in the beginning? Will she have a second chance, or will she be labeled a 'dummy'? I was a slow developer, but my mom said that I would catch up, and she wasn't worried. They put me in the classes for 'slow' kids. The other kids picked up on that and were awfully mean to me. It turns out that I was younger than most of the kids in my class—something about when I was eligible to start school. I was always behind, and most of the teachers wanted me out of their classes because my scores helped skew down their averages. I made them look bad. There were only a few teachers that took me where I was. I never understood why testing had to be one-size-fits-all."

"I never would have guessed that you were behind, Annie. Look how much you are contributing to our discussions. I bet that was hard on your self-esteem."

"Now that I look back, they assumed I wasn't academically smart. So, they put me in classes that prepared me for work. You know, math turned into how to make change if you worked at a fast food place. Writing exercises were designed to write job applications and

letters to social service agencies. We also had time to play and do 'hands-dirty' activities like art projects and cooking. You know, things the smarter kids never got to do."

"Did anyone else get stuck with the wrong label because of testing?"

"I did, but my experiences were the exact opposite of Annie's. My dad taught me how to take tests. He taught me to pay attention to exactly the way the teacher presented information. I didn't think much about it, I just repeated it on the tests; I always scored at the top of my class. When I got to high school, I flunked some classes because the teacher didn't tell us the answers to memorize.

In tenth grade I tried to drop out of school. The counselor called me in, raved about my old scores and asked me what happened. I told him. I'll always remember what he said, 'Claire, you must engage your mind. You must learn to think on your own, and not just re-gurgitate information.' It's that critical think-ing component. Now I know I'm a really good student, but it took me a while to understand what education was for. It's like I had to move from being trained to being educated. George, you told me you had problems too."

"You all know me now, but I think you wouldn't have liked me in elementary school and especially middle school. I did okay on the tests. Probably a 'C' student. I got labelled a 'troublemaker' because I knew something was wrong and I acted out. I've always had lots of questions about things. In class, I wanted to know why we were being forced to learn something that seemed useless. In math, as they prepared us for algebra in ninth grade, they said, 'You need this because it makes you think.' Think about what? I'm thinking when I ask why? Well, that was just the beginning. I wanted to know why we were taking the tests. 'Because that is what we must do,' they answered. Do for what? We never even get to see the results. Well, I had to learn the hard way to just do it and not think about what they were doing to me. It still bugs me. If I seem to have pent-up anger, that's why. In the school we design, let's do something about that kind of BS."

"George, Claire, Mary, everything we hear is how limited norm-referenced testing is. How the results that aren't even valid are used to flunk students, fire teachers, and close schools. What a scam! Why even use them?"

A lot of what we hear reformers propose are one-size-fits-all fixes. They either want to kill public schools, or they think competition and choice are ways to improve education. Most fail to define the problems, yet they have solutions that seem right to them because they have so little knowledge of what schools do. Few have looked at formative growth and how schools address the whole realm of education that cannot be measured by norm-referenced tests. I don't think they consider many of the items on our list of skills for the future.

"If I want to know how I am doing vs. kids in another state or country, summative tests might give me a clue, but . . . all they measure is data retention. We know those tests are culturally biased and designed around select data sets that don't fit people who have other intelligences and ways of functioning in the world. If you don't fit their mold you will definitely fail these tests."

"And Annie, the creeps will give the school an 'F' rating and maybe fire the teachers."

"When I asked my teacher about testing, she had a different take on things. She said that testing is one of the most effective

teaching devices she had but, she only tested to teach. She used tests to get us to focus on specific information. On her multiple-choice tests, every answer was correct. The student had to explain why they picked a), b), or c). She knew that when we selected a wrong answer on the usual multiple-choice test, it still made a connection in our brain, and she didn't want us to have that wrong answer stuck in our heads.

She said tests that only measure what a student recalls do a lot of damage. Every time the students selected a wrong answer, that connection to misinformation was hard-wired in their brains and relearning was very difficult. She always went over the test and used it as an opportunity for discussion. We learned a lot. That should be part of our testing strategy in our school of the future."

"I agree Annie, I think this kind of stuff happens when educators using outdated information, or non-educators, decide they have the right information to fix or close schools, or to attack teachers. They have outdated training or they don't have correct information, and they jump to simple solutions to very complex situations. I bet they

never talk to students. My teacher said that testing is big business. They sell tests for everything—even doctors and CPAs have to pass tests and pay big money to get tested. The testing companies help pass laws or make rules—like for college admission—that require students to take their tests. The SAT and ACT tests generate millions and millions of dollars every year. There are a lot of studies that show test scores don't even relate to success in college or life. My Dad says universities don't have time or staff to go through all the portfolios that get submitted, so they hire companies to screen applications for them. Machine intelligence looks at data and throws out any applications that weren't filled out exactly right. My brother didn't get considered at a major university because he didn't use the right keywords in his application form. When he called them, and talked about his qualifications, they told him he sounded like a perfect match; they encouraged him to apply the following year. Because he didn't fit the machine's formatting criteria, he lost out. That isn't right."

"I agree, Bob. Hey gang, while we've been working, I did a Google search on testing

companies and found this. It's from an article about the World Bank's alliance with Pearson Education, one of the largest testing companies."

> Edwards' third point is something that directly concerns parents and teachers in the United States where students are battered by high-stakes standardized assessments that turn schools into test prep academies. [The Human Computer Interaction system] HCI ranks countries based solely on admittedly imperfect test-scores. Edwards charges that the World Bank's ability to use loans to dictate government policy will mean that instead of strengthening education systems, HCI ratings will encourage teaching to the test and a narrowed curriculum. — David Edwards, General Secretary of Education International

"Exactly! It is a way to force conformity and an alignment with political agendas. And tests aren't the only problem. I'm surprised by how out-of-date the textbooks are. I've heard a lot of what schools teach is dictated by

textbook companies, curriculum developers, and profit-seeking companies. Some of it is probably good, but a school of the future doesn't need to use canned material that does not conform to a new type of learning. Some of my teachers have started to move away from textbooks; they assemble readings from a variety of sources. We can find what we need for assignments using the Web or through online research data bases with our library card."

"Frank, everybody, I've heard enough. Not only does education have to change for the future, but there are some really big players like Pearson that will fight like heck to maintain their cash flows. Testing is way too big a business. These companies are connected with government agencies, banks, and lobbyists that will block every single change that must be made. Seems like they are perfectly aligned to abuse data-driven machine intelligence."

"OMG, Bob, that was depressing! At least I think we figured out that summative testing is not the assessment tool we want for the future. We do need some way to measure mastery. I hope formative education is going

to lead us to a more enlightened solution. Doc, you said that formative assessment measures point-to-point growth within the individual, right? Let's see what else we can find."

"I got on Wikipedia looking for more info about formative assessment and now I'm more confused than ever. Listen to this one. I found it on the site edglossary.org/formative-assessment.

> Educators may also use formative assessment to: Refocus students on the learning process and its intrinsic value, rather than on grades or extrinsic rewards. Gives students more detailed, precise, and useful information. Because grades and test scores only provide a general impression of academic achievement, usually at the completion of an instructional period, formative feed-back can help clarify and calibrate learning expectations for both students and parents.
>
> Students gain a clearer understanding of what is expected of them, and parents have more detailed information they can use to more effectively support their child's education.

I like the part about giving us more detailed information, but I'm not so sure I understand it all."

"Mary, read further down in the article. this seems to apply."

> Some observers express skepticism that commercial or prepackaged products can be authentically formative, arguing that formative assessment is a sophisticated instructional technique, and to do it well requires first-hand understanding of the students being assessed, sufficient training, and professional development.

"Okay Doc, it takes into account the individual learning needs of each student, and that is good. It also confirms that testing companies would be hard pressed to develop a formative assessment tool. How it could be applied to evaluate the mastery of the skills we have identified is another story. Any suggestions? Claire?"

"So, we're saying that we need an education system that focuses on the point-to-point growth in these human-centered areas. We need to shift the focus away from

summative norms already established and in place. We are getting closer to our goal.''

''Closer? We are right there! Last night I was searching for more information about human qualities and Dad's friend, Harry, suggested I should Google Katie Martin. I found this link to her site, katielmartin.com. Here is a list of the future skills she provides.''

2022 Skills Outlook:

-Analytical thinking and innovation

-Active learning and learning strategies

-Creativity, originality and initiative

-Technology design and programming

-Critical thinking and analysis

-Complex problem solving

-Leadership and social influence

-Emotional intelligence

-Reasoning, problem-solving and ideation

-System analysis and evaluation.

"That's not so different from what we are coming up with. I know we are not wasting our time when I learn what others are working on. You know what? I'm building my own web of resources as I learn of people who are concerned about the future of education—our future. I'll share it with anyone who wants."

"Thanks, Claire. It really feels good to connect with others! I see spiritualism is on our list, but not on hers. I've been meaning to ask why you all think we separate spiritualism from religion?"

"I think spiritualism and religion are not the same thing. Spiritualism sounds to me like the broader sense of something beyond ourselves, while religion seems tied to a more specific set of rituals and beliefs. I think teaching an attitude of awe and wonder about Nature, the world we take for granted, and our Universe, is important. We also need to be inclusive of all religious beliefs, not just any one in particular. Check this out. I looked up spiritualism in the Oxford Dictionary."

> The quality of being concerned with the human spirit or soul as opposed to material or physical things. The shift in priori-

ties allows us to embrace our spirituality in a more profound way, a deep sense of spirituality that connects them to the natural environment.

"That sounds like something distinctly human that machines don't have."

"I think my art teachers have a better ability to measure the growth of a student's connection to the natural environment, and the search for being. They seem to encourage students to see the world in creative and spiritual terms. But all teachers who teach kids, rather than subjects, must understand the deep interconnectedness of one to all. Math, for example, is fundamental to the creation of Brunelleschi's dome. Math is the tool, but the dome is a creation. Right Frank?"

"All the data in the world, even with complexity of AI algorithms, cannot replicate the flexibility of the human mind. It is adaptive and spontaneous. It combines things that are seldom in the data pool, like things that humans imagine and seek and things that expand from data-driven tools to new and wonderous forms or adventures. Imagination is a human attribute. Maybe the occupants of a

future dominated by machines wouldn't define it as necessary because it isn't predictable."

"Guys, what about risk-taking? Is that something a computer can do? Somehow, I don't think so. It could calculate probability percentages of successes or failures. But that last part of the decision, to go ahead even when the odds are against you, that seems human to me."

"Dan, I think AI solves problems by following data-driven rules. Step-by-step, a formula guides it. Man doesn't always work that way. The unknown and the path to the unknown is not understood—not in the human data banks. Not only that, but the path may diverge into new territory, and the human can explore the unknown and go in a direction that is new. I don't think data-driven AI with algorithms can go into the unknown."

"So, let me understand this, George. Man has the ability to imagine going to Mars?" Space is an unknown territory, and man visualizes, with limited data, what he has to do to get to there. He assumes he will adapt as he needs to and survive. Man can use data and build machines to explore, but machines do not have the ability to envision and adapt to the

unknown in situations where data is limited. Machines are tethered by data streams they can access and manipulate with algorithms. Man is willing to jump and land, knowing that he will use the tools at hand while taking risks to generate new data and inform his decisions. Remember Brunelleschi and the one hundred years of work based on the belief that man would find a solution to the dome problem?"

"George, everybody, I think we really don't know where machine intelligence hits roadblocks. We do know that man often proceeds with limited data. We're assuming that man can proceed in ways that are not data-driven. They are intuitive; based on faith. Man is unpredictable, and yet those who are collecting data tell us that we are very predictable. I think unpredictable behavior is definitely one of our assets—you know, the influences of imagination, intuition, and spontaneity."

Chapter 14

I hadn't questioned how the schools used our time. Are you saying that if the way we learn, humans learn, drove the educational system learning would accelerate?

We talked about quite a range of things at our last gathering. Let's talk about the pace of learning a bit more. We agreed that through formative assessment, each individual student can move through the curriculum at a speed that matches their learning style and ability; and be tested for mastery as they move along. Those are good objectives. Are there things we can do to actually accelerate learning? Computers can add data at light speed. Schools present information—call it data—at a pace determined by all sorts of outmoded restrictions. For example, a school year is roughly 176 days. Out of that, there are probably less than 150 days when students and

teachers can interact effectively, especially with the current testing mania. Contact time is called an hour, but actually it is about 42 minutes or less. Subjects are taken by quarter or semester, and most courses are two semesters or four quarters. We all know we don't learn in bite-sized pieces like that. If educators and students designed instructional time, it would be structured differently. When the school day was set up over a century ago, it was childcare considerations and agricultural needs that determined the structure.

"I hadn't really questioned how the schools used our time. So, you are suggesting that if we could follow our interests and dig into something, for longer blocks of time, we would learn faster?"

"Doc, it sounds like you are implying that the system is intentionally designed to slow down learning. To keep us off the street. I know there are times when I definitely felt held back. My dad told me that I had too much passion for knowledge. I think he meant I couldn't learn things fast enough. I guess I'm a pretty good self-directed learner. I never thought about being in conflict with the way schools were organized. He encouraged me to

work in the system; to get what I needed from school—my sports eligibility, a diploma, and my college admission. I could pursue other interests outside of school on my own time.

I always wondered why we spent so much time on some stuff; 150 doses of some subjects can be super boring. Any passion and motivation I have in the beginning, gets lost. A few months ago, we had to read To Kill a Mockingbird out loud in English class, paragraph by paragraph. It took weeks. I finished reading it in one afternoon. It was great. I was ready to discuss so many things about it, but . . . I finally talked the teacher into letting me go to the library and read on my own. What a waste. Why should we be subjected to this kind of thinking? It is such a waste of my time and mind."

"George, we have to remember this stuff was developed for another time, before the information revolution. Those educators needed a lot of time to find reference books, create homework, develop worksheets, and develop tests. They didn't understand the concepts of learning at your own speed or Doc's idea of 'no education without immediate and practical application'. They were trying to Americanize

people who came from around the globe and to provide childcare so the parents could work in the factories. Right, Doc?''

Absolutely! There was one pioneer in the early 1900s that created a system of self-directed learning. You've probably heard of Maria Montessori. There are many private schools that embrace her system today, but in her day, her ideas were so threatening to the education establishment, they blackballed her.

''You know this whole campfire project is an example of how fast and how much we learn if we are solving problems and are passionate about what we are doing. Most of us have never experienced accelerated learning before. If we take ourselves as an example, human learning can speed up, not as fast as computers can analyze data, but fast enough to count when you are following your own path.''

Well, Dan, you are right, it is different. Humans can be motivated to learn with a passion. The fact that most are held back by slow, outdated systems has to be something that must change in the future. The system should be able to meet the

individual student's needs and interests, and not force the individual into the system like some widget.

Hey, what's going on? Steve? Sarah? Don't you two agree? I see two very angry and confused faces.

"Well, Sir, when Sarah and I Skyped our respective parents the other day and talked about this class, they went ballistic. We each tried to explain as best we could about what we are working on and their reactions were the same. They think you are dangerous. They said you are using us to sabotage our country. They said that some of the greatest minds, using the Bible, designed the education system and that all this crap about AI and computers is a subversive plot to undermine America. As we tried to discuss it with them, they got even more upset. They are convinced everything we are working on is a way to go against our Christian beliefs and God's will. They both said everything you are teaching undermines our family values. It was pretty rough."

I'm sorry to hear that. What are your thoughts about the class? Do you think your

parents are right? I know that you have to honor your parents. What will you do, Sarah?

"I think my parents are wrong. I believe in science and research, but I can't go against them. They will disown me. I can't make it on my own, not for another few years. They even have an evangelical Christian college picked out for me. If I continue with you, I will insult their beliefs and cause dissension in our family. I'm sorry, but I have to drop out. When I can, I want to be involved and know what you come up with."

Steve?

"I don't know for sure if my parents are right or wrong. They follow the son of a major religious leader who died and left him in charge of the congregation. He speaks for God and my parents are guided by him. I have to do what they want, Doc. Like Sarah, I have to drop out. If I were older and could support myself, I would stay in . . . I've learned a lot already around these campfires."

Of course, I am saddened. We all are. But you have to keep peace at home and honor your

parents. Disagreeing with them can only bring pain and a rift in your families. You do not have to make a choice between these quests for knowledge or the beliefs your parents have. In time, you will have to make a choice between their beliefs and your own. You belong to the future and you have time to inform yourselves. We are all friends now, and close friendships endure through time and often get stronger. We will miss you.

Is there anyone else who must leave? Any problems at home? Anything I can do?

"Doc, we know there are always opposite thinkers. Look at the state of our political system. I can't talk to my parents about . . . anything. So, we just don't talk or if we do, I nod, smile, and leave."

"I'm lucky. At my house, my parents are really supportive. We have great discussions."

"Hey, Annie speaks for most of us. Our parents are excited about this approach to learning. Well, actually, if I say this right, what we are learning together. Let's keep going."

"Hey, gang, can we clarify a few things? For example, what do you think is the difference between thinking, and calculating data? It seems like computers don't really think, they

calculate. We should make sure that our school for our future includes programs that make humans think, and not just calculate. I'm sure too many test-orientated schools just measure calculation based on data, not thinking.

Humans reason. For example, you get a fill-in-the-blank test question like: Columbus sailed to America in ___? Your choices are a) 1492 or b) a boat. Any thinking person would know that both answers are correct. But, based on what is taught, the only correct answer is 1492. Test makers want us to be more like computers—don't think, just give us the answer that was programmed into you."

"I agree, Frank. We need an education system that uses AI as a tool, but doesn't block our creativity."

"I guess this discussion with Steve and Sarah has made me realize that there are ethical considerations to think about as we design this new school; ethical considerations that machine intelligence can't understand or control. But, just like us in school, they are manipulated by it. At the end of the day, even algorithms are biased by the intention of those who create them."

"The control of AI is too complicated to have one off switch. At every level, humans must be prepared with the necessary skills to redirect machine intelligence so that our technological advances continue to benefit mankind as a whole and protect the natural world. We have to be humanity's strongest advocates; we need balance."

"To do that, we need a well-educated citizenry who are competent in the skills we are identifying; we need a delivery system, a.k.a. school, that accelerates learning and follows the needs of the individual learner."

I think the process of learning that we are collaboratively experiencing in this class could be an effective model to build upon. What do you think, George?

"I do. Doc, you are definitely present and available, but you are not leading or force feeding us anymore. You said it was up to us, and we are feeling that power, and responsibility. I was thinking, when someone asks me what do I do, I answer, 'I go to school.' That implies that I go someplace to learn; a physical location. I do that, but more and more, I learn

everywhere, every day. If I am honest, I go to school but a lot of my day there is spent not learning. I know I am being warehoused so that my parents can work, but if the school removes me from those activities where I am super-charged . . . what then?''

''Like the rest of us, George, you learn how to shut down; to not be a learner. Or, like you shared with us last time, you act out and end up in trouble. Most of the time we are never involved in doing something practical with the information we have learned, right Annie?''

''I wouldn't say never. We talked about courses where you are allowed to be creative and accelerate learning, like art, music, sometimes student government, and a few classes where you get out of the confines of school and make a contribution. Mary, what was it you said when we were discussing this?''

''That school is a place where you are removed from the society, to learn about the society. That explains why so few understand how our system works.''

''But it goes much deeper than that, Mary. Subjects in school are often taught by

removing students from the application of what they are learning. Take math, for example. Mathematical applications are best taught by applying them to solve problems. Why don't we teach math through projects that connect with other disciplines? Why must math be a separate discipline when it has so many interdisciplinary applications?"

"So, the application of information through real-world projects and looking at things from a variety of inter-connected disciplines sounds like two good ideas to incorporate in our new school. I know we could learn about history, science, research, reporting, and math by taking apart and repairing a boat motor, or a computer for that matter. I'd love that!"

"What else would we add to our design? Are there existing parts of the system we would keep?"

There are good things about the present system, and some structural things that need to change, like the role of the teacher, and the way time is structured; the lack of self-directed learning, formative assessment, interdisciplinary approaches, and the practical application of concepts.

We should also keep in mind the existing system has distinct levels of education that differ as we age. We have elementary, middle, and high school, then continuing education programs like trade schools, community colleges, universities, and all sorts of on-the-job education programs. Education is age-related through high school, and then age doesn't matter. We need life-long learning skills to be flexible and ready for rapid change. Learning doesn't end when we graduate.

"Lots of schools are community centers for the whole neighborhood; they bring people together and serve as a resource for students of all ages. What about the idea of older kids teaching younger kids? I loved it in elementary school when my grandma came in to listen to us read. She liked it too!"

"Don't forget socialization—what you called 'Americanization' and the building one country."

"What about sports, drama, and music. Marching band is part of football games and community parades, and kids perform plays for the community."

"And clubs. I've have learned more about leadership through my clubs than in any class."

"It doesn't end after high school. Trade schools, community colleges and universities keep America together."

Sounds like you are drawing on your own experiences to focus your ideas about what works and what doesn't.

"A lot of what we learned is what we observed happening to other kids or stuff that happened to us. I just realized that another way we differ from computer-based intelligence, is that what we learn and think about is concept-driven, not data-driven."

"Nice point, Ben. I'd say it's pretty clear that we need to cherry-pick the best parts of what better quality public schools are doing now, and we need to incorporate many of the human skills we have identified. We have to change the delivery system, how the classrooms are structured; how assessment works. We are aware there are forces that are attacking public education and attempting to destroy America. They want to destroy any system that gives power to the people. They want to amass wealth and power for themselves. We want to live in a world that spreads

opportunity and wealth to build people up, so they can contribute to the best of their abilities. We need educated independent thinkers not automatons.''

''Won't they destroy their own future if they enslave the people by dumbing down education?''

We'll see, Claire. Right now, they are winning the battle to destroy public education, but the tide may be turning. If history is any comfort, they will lose eventually. We shouldn't forget that once, many of them were average folks just like us. Some of them inherited their wealth and power through little effort of their own. As they became billionaires with power, in their minds, they were superior. Some even use their religious beliefs to rationalize a kind of self-righteous power to control the lives of others; to deprive the poor and destroy the planet. They are takers, not givers.

''You're right about that. The God they created in their own image is really selfish and vengeful. Pretty different from my idea of a compassionate God that lifts everyone up.''

''Doc, I don't get how people think God only works for them. If they are in control of

the system, maybe we should study them to see how we can motivate people like them to change their views. Know thy enemy, right?"

Mary, this is not the place to focus on them. What we are doing is much more powerful than even the heirs of Sam Walton, the sons of Fred Koch, or fanatics like the DeVos and Prince clans. We are putting our energy into positive change and a different kind of future.

"But how can we possibly overcome those powerful few in key positions who are destroying public education and using their wealth to manipulate the rest of us? It's hard to have hope."

"Just wait until they use AI to maintain their power. In fact, I bet they already are."

"George, that is a scary thought. I think AI and the self-serving few can be countered in the same way, with time, persistent action, and an educated populous that speaks up for different values that are inclusive, not exclusive; that are humane. That is why it is so important to shift the education system to focus on those skills that are formative and very human; not trained, not inculcated, not purely data-driven."

"How do we do that and not repeat the flaws in the system as they are now. We've all complained about top-down coercive systems. We aren't going to create one, are we guys?"

"The reality is that those people with the knowledge to lead are faced with the same old problem—how to get others on the same page. Most people won't understand why we are changing things. It's like Sarah's parents. They have strong opinions based on their world view, and they are not willing to question them. They know they are right, regardless of any other information you present."

"What did people do in the past? Does anyone know? George, you must know."

"I think they took them over the hill and knocked them in the head. I know why leaders are tempted to kill off the opposition. It is a lot easier than changing people's minds. It takes a long time to see the impact of these bad decisions in a country as big and unwieldly as America. But, you can only grind people down for so long before they rise up. People will take to the streets to demonstrate their disagreement with the '1%'."

"We have to work to outvote them. We talked about citizenship and being actively

involved in real issues in our communities; this is a perfect example."

"But, Annie, what happens when the powerful few fix the elections so the people who are working on meaningful change always lose? That's in our history, too. And what if these oligarchs use AI to manipulate people through social media in order to spread dis-information and achieve the opposite of what needs to be done? In our own lifetimes, we have experienced several elections where the presidential candidate that won the popular vote, lost because of gerrymandering and the electoral college. How is that true democracy? Maybe all this talk about our American repre-sentative democracy is just a bunch of bull; some cultural myth that we've been force fed."

"To make democracy work, people must believe that they are empowered; that they are part of the solution, not part of the prob-lem. What can educators do about that?"

"Start young. Teach values of inclusion, tolerance, and compassion; expand contact with other cultures and belief-systems that are different; replace our fear and isolation, with curiosity and involvement. It's going to take time, persistence, and patience."

"My dad always used an expression that made my mom uncomfortable. 'It is in them with their mother's milk'. I guess we are talking about sweetening the milk. If you control what children are taught, you have the power to force any belief system on society."

"Whew! I'm definitely on mental overload. My processors are slowing down. So much for outpacing a computer."

"Doc, where do we go from here?"

I recommend we take a little longer break so we can revisit and process what we have done so far. You have identified many skills, and some core structural components of your school of the future. I think we are making great progress. Thanks, everyone, for the good work!

Chapter 15

We must measure the point-to-point growth within an individual and his or her use of data to solve problems or to check the validity of information.

Welcome back everyone. What's on your mind, Mary?

"After last time, I thought we had come to the end of our search. I lay there trying to sleep and my brain was processing, processing, processing. All at once it hit me. It is all about communication. We have to find ways to communicate our findings, use social media, and spread the information society needs. We can't lay it on people, we have to share our results and let others take ownership; to run with it like they recommend in that book the Starfish and the Spider. We need to find ways to fit

into some part of the way they already think, so we have a common place to begin. Change cannot be top-down. In fact, if we use the word change, many will resist it. It cannot be seen as something new or different. We can't create an 'us vs. them' sort of dynamic. It has to be couched in the current language and the current thinking."

"It also has to complement what is taught in teacher's colleges and what parents expect. It can be introduced without getting people's hackles up. I like the concept that our information evolves education and becomes a natural for the future."

"Yeah, Claire, but we can never use words like evolve, new, change or any words that will make some think we are messing with the established system. This progression comes from the inside, not outside. We are inside and doing what teachers and parents think schools do—nothing new, just emphasizing more of the stuff we have identified and moving away from the old stuff that doesn't work. We need to identify and work with those teachers who get it immediately; who are open to letting the kids fly with it. Based on our own experiences,

most of our fellow students will be excited and will carry it forward once they get how it works. They may have to adjust, like we did, to leading and being self-directed instead of being passive. Isn't this what education is supposed to be?"

"It is, Mary. And when we introduce this 'approach' and we package it in a way that is accessible, non-academic, easy to understand, easy to read, and easy to implement, we can begin the process of internal change. What do you think, Doc, can we do it?"

If you are asking, can you package this information in a way that is non-threatening and introduces a model for an education system necessary for the future, the answer is yes. It is clear that the culture is changing its relationship to technology, and you, the students who will live in the future, will demand a different kind of approach in school. People know the system is broken. When the time is right, and your plan is clear, it will be embraced, and spread throughout the system; a slow-burning ember that will turn into a wildfire.

"Hey team, let's focus on what we can do and not get overwhelmed by the difficulty

of making it happen. We have gathered a lot of good ideas about what we need to prepare us for the future."

"Right, Bob. First of all, we have already identified a bunch of qualities to include that humans have and AI most likely does not have. We know that academic achievement must be measured by the learner's ability to apply learned data. We agreed that standardized test scores are pretty meaningless; we need to measure the point-to-point growth within an individual, and his or her use of data to solve problems, or to check the validity of information."

"We started at one point to talk about how the school day was structured based on the needs of workers to have childcare while they worked. Summer break was created to allow kids to work on their family farms. I think we need to explore that idea a little more."

"I'd say teachers and babysitters are not the same thing."

"Still, in elementary school, I think you need to have some of both. I'd agree that the school of the future needs to differentiate be-

tween childcare personnel and educators. We also have to recognize that each teacher has important dual functions. There has to be some spillover between responsibilities.''

''We don't want the need to warehouse kids during the day to dictate the structure of the education program.''

''We also want the education program to develop social skills and cultivate an understanding of what it means to be an American in a world of diversity.''

What I hear you saying, Dan, is that the childcare function in our school has to include learning activities like socialization, play, and lots of creative activities that result in a love of learning and the roots of self-direction. The roles, responsibilities, and required training for childcare faculty and teaching faculty are quite different, especially as we move into middle school and high school. We have to be very careful to maintain some continuity throughout the school curriculum.

''Nurturing and loving are always important, but what educators do is mentor, motivate, and set the learning parameters. The guide-on-the-side idea.''

"Right, Annie. Which is why we need to clarify that what all teachers will do, in every grade level, is stimulate thinking, evaluate, internalize, and apply concepts. They should not be pulled off task by bus duty, taking attendance, patrolling the halls, supervising the lunchroom, or disciplining some disruptive student. Other people can handle these types of non-teaching tasks, drills, and discipline. Right Claire?"

"Sounds good, but what about kids that have trouble with self-control? What about students who need constant supervision?"

"For one thing, schools that keep kids dependent, compliant, and easier to control just perpetuate the problem. It is a lot better to teach independent thinking, self-directed learning, and personal responsibility in elementary school when the kids are open vs. trying to correct problem behaviors when they are older. I think a lot of the behavioral problems will go away with a different kind of structure. Plus, our school will have the flexibility to individualize a learning plan that can accommodate the specialized needs of these kids."

"So that goes back to what we talked about earlier, the childcare function has to split off from the teaching function."

"Boy, I have had teachers straight out of college without any experience except student teaching, and I don't think they understand all of this. I went to a charter school for a while, and there we had teachers that weren't even certified."

I think you are beginning to understand how complicated the process of teaching really is. There is no substitute for trained, certified, experienced teachers. In effective programs, competent professionals deal with problems that arise from the needs of students that are ready, or not yet ready, to advance academically or behaviorally.

"So, what happens when we spend more time in virtual space and less time in a physical building? Through our technology, we can have access almost 24/7/365 to educational resources. Almost all of us already have experience with avatars through gaming. This isn't new technology for us, but it is to a lot of existing educators. Will they be open to it like you are, Doc? How have you managed to adapt to all these changes?"

My sons actually introduced me to avatars. It took me a while to understand what they were and to figure out how they work. Once I understood they were a graphic representation of me as I used an online program, I was intrigued. I was amazed by technology that allowed me to change my features, gesture, move through virtual environments, and communicate with other people within these virtual worlds. Once I got over my feelings of inadequacy and my lack of experience with the computer interface, I was thrilled by the application of this technology to teaching.

Suddenly, it meant that a very diverse group of students, from anywhere around the globe, could meet for class at a prearranged virtual place and time. I realized that a non-player character (NPC) which is generated by a computer program in video games, could be designed to do some of these tasks we just mentioned. Avatars can take over many redundant tasks ranging from attendance to posting progress reports. They can also relieve the teacher's workload and responsibilities by making announcements and scheduling meetings; so many of those things that take time away from the teacher-student experience. NPCs could be programmed to work with students on redundant tasks like multiplication tables, or spelling. It's like when

you complete a quest in-game, you have to demonstrate you have met all the required steps, and the virtual characters check them off and certify your completion.

It didn't take long to realize these were both valuable tools to have in my 'war chest'. I am 'old-school' it is true, but I do have concerns about the uncontrolled use of NPCs. There are those who would use them to replace teachers completely.

NPCs could work well for some tasks, but it seems to me that they have their limitations. The avatar is just an interface that allows you to virtually connect with a real teacher who can diagnose students' learning needs, participate in discussions, and be present. So, that is a long answer to your question. As teachers open up and familiarize themselves with advances in technology, and of course, younger teachers will already be 'digital natives', and not 'digital immigrants' like myself, the use of avatars and virtual space will become accepted and commonplace.

"Every student must be prepared for self-directed learning in the real world and in virtual spaces open 24/7/365. The limiting use of physical classrooms with seats and a chalkboard has to be extended to include more

interactive and up-to-date resources that make education more economical.''

''And don't leave out that a classroom is filled with students who were placed there because of age. Traditional schools group kids by age, not development level or learning style. Even with a master teacher, there are students that have different types of intelligence and learning speeds who often get left out. Technology can help with that.''

For students who are ready to handle more independence, the school day can be gradually expanded to your 24/7/365 model incorporating the use of avatars and NPCs.

When they have proven successfully that they can function in virtual space under supervision, they can gradually move into virtual time where advanced discipline, self-directed learning, and relationships with educator mentors can take place, not in isolation but in communities where interaction is enhanced. This learning community of ours is a perfect example.

Other students not yet ready to move into virtual time and space are required to attend classes in a more traditional way and be under the direct supervision of a more traditional teacher. The goal

is for all students to become self-directed learners, but there must be provisions for those who are not yet ready, because they are not able to function in the real world of authentic applications where they have to take responsibility for their own actions.

"Well, it is going to take a lot to convince parents that we are actually able to work effectively and be safe working outside of a traditional classroom. Some, like my parents, understand what I am doing, they trust me, and even want me to teach them how to use virtual resources. They want to be part of the future; they don't want to be left behind in the past. My guess is, they are pretty unusual."

"We definitely have to change the current model where students rely on the teacher as the main purveyor of information. In many ways, students are already driving the change because of our familiarity and use of internet resources. Communication will no longer be primarily one-way, from the teacher to the student. We've talked about how this is a carryover from the coercive top-down model that has blocked true education. The use of virtual space will continue to be a necessary and useful resource. The fact that people have

hijacked it and used it to get rich should not be used to deny the importance of the use of time and space that makes groups like ours possible."

"Okay, let's also add that many of the resources now available through technology are vehicles through which systemic change can be accomplished. Through technology, more people have the opportunity to work globally from a school or home base; it is easier to connect and spread ideas around the planet."

"Class size and student-teacher ratios are still a concern, even in virtual space. We still want teachers to be able to individualize; to provide mentorship, motivation, and learning projects for students that would end in a contribution to themselves and society."

"Some of us went to Montessori schools. Maria Montessori taught that the key to education is observing and knowing each child—you cannot teach a child well whom you don't know well. But the way public schools are organized, there is no way a teacher can observe or know each child. My classes had a minimum of thirty students, some had forty-five. The teachers had less than one and a half

minutes to focus on any one of us. That was impossible. They got to know some kids a little, but none of us well enough."

"Frank, I agree. That problem applies to online schools as well. I have friends who took online courses and failed miserably. It was a great idea, but people who ran the virtual learning programs soon learned that they could make more money by increasing teacher loads and cutting back on accountability. The teachers weren't available when you needed them. How could they be available on demand 24/7? They have lives and families too. A lot of kids just don't have the necessary focus and discipline to compete online learning programs. They are not used to being self-directed learners. They ended up with a lot of debt."

Claire, that's typical of both public and private schools and a source of great frustration for true educators. The structure is in the way of good teaching and learning. But it could be different, if teachers are willing and able to change roles so they engage primarily in guiding the learning path of every student. Teachers must be free to teach, mentor, and excite. Given time, every child's needs can be diagnosed and an individualized prescrip-

tion can be developed to meet those needs. Each teacher will definitely need to use classroom aides and virtual resources wisely to support themselves.

"You know a lot of us have been involved in online gaming for many years. We love being immersed in virtual world environments and are very comfortable connecting in-game. The challenges of the game help keep us continually engaged; there is usually an element of reward for completion of tasks and the acquisition of power objects. I think educators could benefit from incorporating elements of game technology into virtual classrooms. We couldn't be working on the design of a school for the future if we didn't use current technology. I can stay focused a lot longer than a class that lasts forty-two minutes, when I am multi-tasking and engaged. Learning, critical thinking, and problem-solving don't seem to happen in these brief classroom encounters of the most limiting kind."

"Yeah, easy to say, but those resources still aren't readily available to teachers. I guess they don't see a market . . . yet. The developers of games, like Sony and any of the top fifty video game design companies in the world,

could easily create programs for teachers so that they could incorporate the types of virtual resources we use."

"Hey, team. I'm also an avid gamer. The code and everything else a teacher will need to use virtual space and avatars to do mundane and redundant jobs, and create a 7/24/365 class-room, have been available for years. I can see why older teachers are afraid of technology, but like you said yourself, Doc, the younger teachers have grown up using it and they are excited by the opportunities that could be. I'm pretty sure teachers and schools would buy the packages and use them. I just don't understand why these products aren't available now."

"Guys, as we get excited about these possibilities, I can't help but think about the people who oppose the very concept of public education—education for the common good. They want it to change alright, but not in the ways we are talking about. In the past, the Federal Government has made sure that each child receives a free, fact-based, Americanizing education. We have grown up with that system. But recently, it seems like everyone wants to get their own private piece of the pie. The

person in charge of the Department of Education seems more interested in privatizing schools and breaking up neighborhood schools than supporting teachers and the public school system. She has given power to select religious groups to replace public education, privatized schools for profit, and segregated schools so that most minorities are denied an equitable education. If state governments follow this destructive path, I'm not sure anything we do will be successful? What do you think, Doc?"

I believe that the American public is not in full support of these changes within the federal or state governments. Right now, our country is in turmoil. History tells us that things like this go from one extreme to another—at least that's the way I read it. People are already slowly beginning to reject this selfish manipulation and the time is coming when America will right itself. That will be your time, your future. We must believe that reason and fairness will prevail. It will take years, persistence, and steadfast involvement but you will live in those years and you will do what is right.

"I agree things are shifting. Look what happened with the Parkland students as a

result of the horrible shooting in their school. Those students stood up, got involved in political activism, and they are leading the way. The system may be super slow to respond to change, but it has to change eventually.''

Chapter 16

Right now, we live in societies that require people to work or go hungry—we think that is the natural order of the species.

"Hi everyone. I wanted to share a conversation I had with my Mom and Dad. This morning, my Dad asked me what I was working on. I tried to explain. He called Mom in and they asked me a bunch of questions. They agreed that what I explained to them was interesting but unrealistic. 'Just think about it,' Dad said. 'Both Mom and I work. We are gone all day and there is no one home to take care of you. If you are not in school where will you be, out wandering the streets? Think of younger kids like your little sister. Who would watch her? What system will you put in place to take care of children whose parents have to work?' It's that whole issue of childcare we talked about."

"My mom said the same thing, Bob. She sends me to school so someone can take care of me. When there is no school, like holidays and summer vacation, she has to miss work unless she can find a babysitter or someone who runs a camp. That's the way things are."

"But things are definitely changing. My mom works from home. She has her office in the spare room. When we travel, she just needs a good wifi connection and she can do her work anywhere. Her employer doesn't care where she is, he just wants her to do her work and be on call when he needs her. I think the way we define 'work' in the future will be really different."

Hey, I was just fishing and I found this, Frank. It confirms what you were just saying.

> Our schools are supposed to integrate youth into our economic system, but the system is undergoing radical change and redefinition. Our factory system for manufacturing and production is shrinking and redefining itself. Unemployment is a major problem. Leaders speak of service jobs and retraining for new jobs. Sadly, they are at a loss when asked to identify

> the jobs we are supposed to train for. The skills a child must be developing now to be able to function in future 'jobs' are mental skills based upon interdisciplinary comprehensive education, self-directed learning, flexibility, creativity, and the ability to apply factual, learned information to new challenges.

"That's right on, Dan. Where did you find it?"

"Ask Doc. He wrote it in his book Vital Lies."

"You know, in our future, we will not be organized around work. Look at what's happening now. There are too many people out of work, and training for another job that isn't there. Many factories are already automated. It makes no sense. Machine intelligence would assess the situation and determine that there is no need, no place, and no reason for these workers."

"What do you think they will do? Become artists, volunteers, gardeners, inventors, programmers? Maybe this freedom from industrial work will allow us the time to reconnect with our humanity, and create?"

"Well, right now we live in societies that require people to work or go hungry—we think that is the natural order of the species. If you didn't hunt you starved. Those in charge of our societies, all around the world, not just in the U.S., won't even consider a system that frees people up from work and provides the essentials of life like food, clothing, and shelter. That sounds too much like socialism.

Historically we have had human slaves—workers to produce the essentials. Then we had energy slaves and things like tractors and factories to provide what we needed. Now we build robots that are taking over jobs and leaving lots of people unemployed. So, in our future, what will we do? We can't demand that people work when there are no jobs. Anybody have an alternative? Dan?"

"Let Star Trek be our guide I mean, really. Roddenberry and others explored a future where people had the essentials for survival and spent their time developing and expanding the qualities we have been identifying; the qualities that make us different than motors for wheelbarrows, or blowers of hot air into one another's ears to sell some-thing that

is planned to become obsolete just so we can buy more."

"I want to live in that Star Trek future. I already dread the idea of having to sell my time to some corporation so that I can eat, clothe myself, and pay rent. I've started to look at the job market, and most of my options when I get out of college are uninteresting, undignified, and a waste of 'Me', my creative and insightful self. I want to make a contribution but it seems my only available options at this time are to pick it up here and pile it over there. Do you agree Claire? Bob? Annie?"

"In the future, I mean starting tomorrow, if that were possible, I want to be more involved. I need the power to be part of our society and make a contribution. I have to continue to develop and use the higher functions of my mind. I want to be involved in problem-solving. To do that, I need to get out of this age-related track the schools put me on and be involved with all age groups doing things that are necessary. I think I need to stop dreaming and get real. The world we want will only exist if we create it. I feel like this is a good start."

"Remember when we discussed a similar situation, the one where education would have to provide for those who were still confined by the old system? How education could not just jump into a new way of doing things? How we had to carefully let the system evolve into our future?"

"So, how is this challenge any different? Education reflects the nation, and the nation changes as education leads the way."

"Exactly! George, if we know where we are going, we can develop steps along the way so that people who can't be retrained or who are too locked into the old ways can still live and even thrive with dignity."

"Change for a few will be rapid, but for many, it will be slower, and take place gradually. I'm sure society will have to provide for people who are slower to adapt to an economy with fewer jobs—a.k.a. unemployment. It can't help but feel like total rejection for a lot of people; telling yourself that you are useless. It can be defined another way though, as an evolved society where human worth is not measured by some kind of labor. The future must be supported by an economic system with redistributed wealth that provides for the

essentials of life, including medical care for all. It must be supportive of human qualities that reflect our higher selves; that redirect resources to the betterment of humanity.''

''Probably the majority of citizens, good hardworking people, will go into early retirement with social security nets that let them keep their dignity. A large percentage of these retirees will search out new ways to stay active and contribute to society. With more properly educated, thinking citizens, our societies will move forward and transition and we might relearn how to help our neighbors without fear and discrimination.''

On that positive note, let's take a break and regroup tomorrow evening.

Chapter 17

What's bothering me is that I've learned the school choice movement has turned out to be a way to keep people of different skin colors separate.

"Hey, I've been reviewing my notes and Bob's. I realized that I am hung up on why we are seeing an increase of segregation in the public schools when the issue has been addressed by the Constitution, the courts, and most state governments going back into the nineteenth century and more recently in the sixties."

"Claire, just look at the demographics of our group. European, Mexican, Asian, African, which could be Egyptian, Nigerian, or Zulu, and a mixture of colors. So many different groups are represented in our campfire circle. We are multiracial and it makes only one difference. We are better for it."

"I understand how empires mined African cultures for slaves at a time when civilizations used human slaves. I understand how Christianity and Islam wrote language to justify slavery into the great books, the Koran and the Bible. I think I understand how slave-based economies prospered in the Americas. I also understand that energy slaves replaced the need for human slaves, and that now tech-created robot slaves are replacing workers. What I don't understand is how human beings can hate and fear people of color. I understand that they were once slaves and that hate is used to justify what was done to them. But what I don't understand is why so many of our fellow human beings—too many I think—have continued to hate and abuse other humans. After so much war and violence, don't we know better by now?"

"I think humans have always feared each other and been competitive with the 'other clan' that might take their resources. It's the fear that 'there isn't enough to go around'. Maybe it's this part of our 'nature' that we are trying to evolve beyond, as resources become more plentiful and our needs are provided for."

"What's bothering me is that I've learned the school choice movement has turned out to be a way to keep people of different skin colors separate. It has almost destroyed America as one nation and has created millions of children raised on hate who vote against 'One America'. Myths of racial superiority are used to keep kids from knowing each other as fellow human beings. I've listened to excuses made by white parents in my neighborhood, friends of my parents, that students of color will keep their kids from getting a good education. I believe the opposite is true. Racial divisions interfere with education and generally create 'deplorables'. We know that economics and family stability are the true indicators of education success. Those are human conditions and not racial limitations. We agreed early on in our discussions that we have a lot to learn from cultural differences and traditions."

"And we all know that hate, bigotry, and fear in America have created private prisons filled with minorities. Imagine what will happen as data-driven machine intelligence amasses the horror stories of what humans have done to other humans in our so-

called civilized society. If these evil deeds are counted and evaluated, who would judge our culture or our species fitness to survive and go forward?"

"Right, Dan. One good thing about virtual space and avatars is that we can create an image that is totally unrelated to race; I can be a dark elf if I feel like it, and a different gender. This will make education an even playing field for everyone. If society is slow to change a race-based culture, let virtual reality point the way."

Chapter 18

I discussed with my Dad how we have identified ways that humans are unique.

"Hey all, sorry I am late. My computer froze. I had to reboot and reinstall the program. Ah, the not so wonderful joys of technology."

We wondered where you were, Bob.

"I discussed with my Dad how we have identified ways that humans are unique. I asked about medical advances that will change humans for the better. He went off on the amazing things research is providing. I can't remember all the things he told me, but he explained how now they are growing human organs to replace parts in humans that wear out. Projecting what is happening now into the near future, most worn out organs will be

replaced using our own body's chemistry and genetic codes. He said that diseases are being eliminated, even though a few nuts have revived measles, chicken pox, and other terrible scourges by questioning facts and inventing religious arguments against science."

"Bob, did he talk about the improvement of life for humans in the last twenty years? Remember that Swedish guy we studied and talked about? Hans Rosling and his great book *Factfulness*?"

"He did. Dad agrees with Rosling that although there are many people living in substandard conditions, never before have the majority of people on the planet been as healthy and food-secure as in the last two decades. He is very angry at our political leaders who have created such severe poverty conditions in the U.S., even though we have the resources to help them counter the effects of our destructive economic system. My Dad is waiting for me to finish *Factfulness* so he can borrow it. When I told Dad he could download the e-book right away, he was thrilled."

"I don't think there is any question that humans have made great strides in helping other humans. What AI and the machines will

find, is that there is amazing progress on many fronts."

"But Frank, human nature is so much about me first and letting others pull themselves up by their own bootstraps. People even create gods that they use to confirm that they are not their brother's brother. But inherent in the species is also the need for cooperation, and unless we have evolved and learned something over the millennia, us vs. them is part and parcel of the species . . . right? It is in our nature to create the in-group and the out-group, the heathen and the Christian, my clan vs. your clan."

"We can't condemn all humans, but I think we have to admit that too many who have accrued wealth think that they are special and that others are inferior. They like to ignore them, condemn them, and make it worse for them, often to prove their point."

"Frank and I were talking lately about the number of people killed in auto accidents—1.3 million a year, as I remember. But think about the cars our parents had—no seatbelts, no padded dashboards, steering columns that became spears in accidents. But then the government required safety features to be part

of every auto made in or imported into the United States. Deaths became less frequent, even as the numbers of autos on the road increased. Now we can even buy cars that have warning devices and automatic braking systems. Some can even drive themselves. Soon there will be more self-driving cars and trucks on the roads, and driver errors will not cause accidents."

"Yeah, then they can blame AI and corrupted data."

"George, I like to think of the things we humans are doing to reverse climate change and save the planet. Look at the advancements in solar, wind, and other alternative energy sources. Those are really great accomplishments. Weighing everything, I think humans have moved beyond the way we were in the past. We should be judged on what we are now, beings with EQ and an awareness of other life. We are in the process of changing and focusing on what we will become, not what we once were. It is obvious that we, as a species, still have major inherent problems to overcome. So, as we continue to evolve and educate students to enhance desirable qualities and take advantage of AI and the data-

gathering of computer intelligence, we will advance our species to a place where we are ready for the future, whatever it will be. We will be ready.''

On that positive note, our class is drawing to an end. I think the eight of you have accomplished a lot in this class. If we have built a foundation—a knowledge base—then others, in regular classrooms and in virtual classrooms like our campfire, will continue identifying the reasons why our species is not at the end. If you want to continue exploring this topic, I suggest you read the works of Yuval Noah Harari, one of the more brilliant minds of our time. We have discussed many of the things Harari has clarified. Reading these works will confirm many of the reasons why humankind must change the way we educate, if we are to survive.

"Doc, if you had assigned a reading list, I might have looked it over and reluctantly selected a title. But my teachers are all giving us required reading lists and . . . my point is that we were empowered to discover many authors, artists, philosophers, and scientists on our own. Who thought I would read so much? I never learned this way before and now I realize these are my sources, my guides, and my

new friends. I have been transformed from a standardized student into an excited self-directed learner. I can't believe I did this to me!''

''Mary, until you mentioned it, I didn't realize that this way of teaching, this cooperative way to solve problems, accelerated the way I learn; I can't stop searching for answers. I stumbled on a philosopher named John Dewey and he wrote that all education must end in a contribution to one's self and to society. Wow, was he ever right!''

''Me too, now that I see what education can do for me. I will take your suggestions to read the works of Harari, Rosling, and many others. Before, a teacher would say, 'Read this and prepare to discuss it.' Now, I can't wait to get those books. I'm much more motivated to dig deeply into things that interest me than I ever was before. I too have become a self-directed learning machine.''

''I can't believe a whole world opened up for me. I can't wait to meet authors who have so much to offer. I subscribe to Diane Ravitch's blogs and through her, I have met people who are really making a difference. I'm reading, Reign of Error, and I have ordered, The Life

and Death of the Great American School System. There is a song we sing in our youth group with the words, 'I once . . . was blind but now I see.' That's how I feel. I had no power, and now I have the power to see a light illuminating the future."

"Doc, I know this class is over, but learning this way and being empowered to make changes and solve problems is a lifelong challenge and adventure. When I get out of school, I want to be a teacher who utilizes the tools of technology to guide students as they focus on developing those very human traits that will lead to a future in partnership with AI. I want to be a co-learner and involved with others in solving our most pressing problems."

"Hey, don't we have some unfinished business? Aren't we supposed to end this class with a guide or something? Something that will tell others what to do . . . I mean, oh, I get it!

Envisioning, creating, and implementing a plan for change is one thing. I know you will each go on to integrate much of what we have learned into your daily lives. We wouldn't want to deny any other students the joy and angst of identifying new

problems, seeking information, thinking, exploring unanticipated aspects of ideas, sharing personal experiences, and collaborating with others to come to conclusions. I think we can now agree, providing the 'cliff notes' for our campfire discussions would be counter to the kind of true learning we have defined. It is the journey that defines us. For those who want simple reports, go get them from computers.

EPILOGUE

Meeting like this, I've become familiar with the way you present yourselves through your avatars. How you choose to look has a lot to do with how your minds work. What I would really like to know is where you are from and why you joined this class? The prerequisite was that you are of high school age, not necessarily enrolled in a high school, and that wherever you come from, you are interested in AI and willing to work on improving the education systems. I know that all of you are in the U.S.—either in the Eastern, Central, Mountain Standard, or Pacific Time zones—which meant that we could all be online together even though it was often a different time where you lived. That's why we met at night.

Dan, your avatar is a Star Wanderer. Where do you live? What school do you attend? What grade are you in?

"San Francisco. I dropped out of school for a year to explore, learn about myself, and

discover more about my Chinese ancestry—I've been trying to figure out who I am and what I am doing here. I should be a junior in high school. When Diane Ravitch introduced us to Yong Zhao, I couldn't believe that I had not learned these lessons from my heritage. There is no way I can ever measure this campfire experience and the people I have met who are now my mentors and friends."

Annie, tell us about yourself.

"I live in Kansas City. I'm a senior at Central, but they don't know I'm doing this. I mean no one would believe it if I tried to explain. Oh, I picked my avatar because I would like to be a judge wearing six-guns and put some of the deplorables away. I have so much to offer, but I almost lost belief in myself, especially since I am still labeled as slow by the school. Nothing I do can change that—at least that is what I thought until I joined this campfire. You know what? I now have my own reading list. In the past I only read what I was assigned, but now I have my own secret list. It's secret because my gang would think I'm crazy for picking these books."

How about you Ben?

"I go by Ben, but it's short for Beniamino. I'm an exchange student from Sicily. I will graduate as a senior from my high school in Siracusa next year. I live with my host family in Denver, Colorado. I am lucky to be with a family that has been interested in the discussions we have had in this course. It has been challenging for me and I have learned a great deal. My avatar is Leonardo Da Vinci because I think he would understand what needs to happen for education to save humanity."

Frank?

"I live in New Orleans. I'm a sophomore at Excelle, a really disjointed charter school for students of color who are isolated from the white community. Schools in New Orleans are still recovering from Hurricane Katrina. My avatar is my Dad because he understands why I have so much trouble fitting in and being accepted. I signed up for this course because I knew it wasn't going to be M.O.S.S.—more of the same stuff. I gained a lot of personal confidence in this class."

Claire?

"I live near a small town in Iowa that no one has ever heard of. I'm a junior in high school. I do all the fun stuff like hanging out, journalism, and I love science, or would if we had better classes in my school. I picked an avatar that reminds me of Tommy, a boy my age who hides out in his basement and plays computer games all the time. I think guys like him may have more to offer education than we might think. I took this course so I get a better understanding of where guys like Tommy go in virtual space. It is so different from what I normally do. I'm looking to checking in with him. Oh, and my Dad is a professor. I learn a lot from him."

Bob?

"I live in Idaho. I go to Central High. I'm Mexican, and my real name is Roberto. I try to meld in, but that is just a way I act to survive in a really screwed-up system. This year I am supposed to be a senior, because I'm seventeen, but I ditched so many days to stay home and help my family, that I may not pass. My avatar is the Hulk, although I couldn't

figure out how to make it green. I saw the course description for this class and figured, what the hell someone is finally in the twenty-first century."

Mary?

"Doc, you should know me. I go to Prescott High school. I have a bad case of senioritis, or I did until my parents learned about what you are doing. I didn't want to do this course, but the only other options were really weak. My family came to Prescott from Tierra Amarilla, New Mexico. We are Hispanic and my ancestors have lived in this country since before it became a country. We trace our ancestry back to Spaniards that came here with Escalante. I am of European heritage, but none of my teachers or even my friends know that. I am discounted because they think I'm Mexican, as if that makes me inferior. You can probably imagine all the prejudice in our community. I think I gave up on finding teachers and friends who wanted to know me for who I am. You know, Doc, this is the first time since I started school that I was part of a team. No one judged me because of my

heritage. I was accepted for my mind and what I could contribute. My avatar is an ancient Alligator Juniper tree that is over 500 years old."

George?

"I'm eighteen, white, and of European descent. I got out of high school a year early by attending a charter school that had almost no curricula, didn't have certified teachers, and was used by parents and kids who wanted to avoid the GED process. I wanted out of school because I would not play the game and waste my time. As you all know, I'm an avid reader and love military histories. My deep aversion to war came about through learning about war. I heard about this class from a kid in middle school who plays a computer game I like, World of Warcraft. I never thought I'd do anything like school again, but I got hooked. I am glad I checked it out. Now, I'm thinking about a job writing code. Boy could I create an education program for use by teachers like you, Doc. This experience, the first I have ever had working with others, has really changed me. Are you going to offer a follow-up class?

I'm going to miss these campfire talks?

Steve and Sarah, members of the original ten who started the class, both dropped out due to parental pressure, even though this class is not structured to be an attack on any religion or political system. Steve is from Oklahoma and Sarah resides in New Jersey. Both selected avatars that looked like religious leaders. Sarah and Steve, interestingly enough, come from communities that feed their children into Bob Jones University, and Jerry Falwell Jr.'s Liberty University. Both of them have contacted me and kept in touch with other members of the class expressing a need to keep abreast of our work.

This class is based on software that is not yet developed or commercially available; the students, were created to tell the story. Soon, as software designers and the creative minds behind gaming turn their attention to education and the use of avatars and virtual space, any educator will be able to incorporate these tools into their teaching.

ACKNOWLEDGEMENTS

I have many mentors; people whose lives have changed mine. It is impossible to list everyone who has brought me joy and knowledge; quandary and questioning. I honor you all. At the top of my list is my wife and soulmate, Jo. Of all the choices I have made in my life, this partnership has been the most important and the most rewarding. Jo and I have two sons, Edward Alexander and David Nathaniel, who have been more powerful teachers than I could have ever imagined.

In my career as an educator many people have molded me, but of all my teachers and mentors, Diane Ravitch continues to be my greatest inspiration. She is a visionary who fights negative forces for the good of America and kids everywhere.

I have been deeply touched and challenged by my 'compadre' and fellow educator, Dan Kenley. Dan is an educator who places love and respect before anything else it takes to educate students.

Together, Dan and I host a podcast called 'Insights into Education'. We identify and interview

great educators, authors, community organizers, and leaders that are making a difference.

Thanks to the following friends, fellow educators, and editors who have given me strength over the years.

Dr. Norman Eck, superintendent of schools (retired), NABSD, Kotsebue, Alaska; Dr. Franz Rosenberger, physicist, professor emeritus, and scholar. Dr. Henry Glick, political science professor emeritus and friend; Dr. Carla Van West, archaeologist, educator, friend; Linda Martinez, community leader, parent, and a strong advocate for marginalized people; Barbara Hatch, educator, visionary, and the power behind the Veterans Heritage Project; Rosemary Agneessens, tireless community organizer, educator, and administrator; Nicky Indicavitch, leader of parents and educational change; Jalynn Bacon Darow, artist, educator, and editor; Mark Hampshire, fellow educator and longtime friend; Jack Hillman, friend and inspiration; and Dr. Leonard Cain, Dr. Robert Kastelic, and Adele Seronde, dear friends in the hereafter.

ABOUT THE AUTHOR

Ed Berger began teaching high school in 1961. During his public school career, he pioneered many interdisciplinary programs that stressed experiential education. In 1968, he began building supplemental enrichment programs for public education in Southwest Colorado. He traveled around the world in 1970 and spent a year studying education programs in twenty-two nations. When he returned to the U.S., he continued building his dream school. He earned his doctorate in education in 1975, the year he created the Crow Canyon Education and Archaeological Research Center. Ed is an education advocate and consultant. He lives with his wife Jo, in Prescott, Arizona.