

## **Moving beyond “Happy, but not hopeful”: The role of higher education in meaning making in human and artificial cognition**

George Siemens, PhD

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### **Genesis of a problem**

In late 1990s, I was an instructor at Red River College in Winnipeg Manitoba Canada. We were the first college in the country to move to an exclusively laptop program. Being involved in this process has shaped how I view technology and my thoughts on the future of learning.

Many of you will have seen a similar classroom in the early 2000s as laptops made their appearance in classrooms: desks reconfigured for electricity outlets, ethernet ports, immovable desks. A new tool changes our practices in subtle ways - ways that feel innocuous but that signal ways in which we will need to bend our behaviour to technologies. We are technified by our tools: our actions and behaviours become those afforded by the technology and the social systems needed to make the technology work.

The technification is subtle at first. For me, it was the process of students entering the classroom and taking the first several minutes to plug in, wait for the laptop to boot up, drop their laptop bag under their desk. The process is, obviously, reversed as they exit the classroom. This pre-post lecture ritual appended their learning and while awkward with new students, after a few weeks, it was automatic and largely performed by routine.

What happened during the classroom remains an area of intrigue for me. The students, connected to one another and to the world, started doing exploratory things. Engaging with one another through ICQ, downloading music, and so on. For them, this new technology opened a new world. For the faculty, however it was a minor inconvenience. Nothing much changed.

We moved our overhead slides into PPT. Our practices remained unchanged, even if the medium was different.

What was it about laptops and the internet that produced such an uneven impact on practices? Why did the apparent “liberation” of students produce new ways of interacting with information while reinforcing existing practices of the faculty? Technology exerts influence based on our position: new levels of control in one population while simultaneously giving another population new actions and a new voice.

### **Why this talk?**

I've been writing this talk passively for almost twenty years and actively over the past four years. My engagement with the global edtech community started through blogging in late 1990's. Blogs and RSS are still the simplest and most dramatic tools of learning in global social networks. While largely textual, they offered a voice, for the first time, for many people. What networks did more than anything else is to allow global interest and identity communities to form where local interest and identity did not. Interests became more important than geography for learning.

Blogging for me became about connections. And connectedness. And Connectivism.

My ongoing attempts to convince people that social networked learning was the future resulted in pushback, notably from academics. Like my experience at RRC, those with a worldview and a position to defend overlook the affordances of new technology.

In response, together with Stephen Downes, I organized an open online course (called MOOCs) at University of Manitoba. Rather than explaining to people what it meant to learn online, our interest was to have people experience it. The experience is the thing of value. Networks must be lived to be understood.

An interesting by-product of MOOCs was the data generated by students as they attended online presentations and engaged in discussions online. In our design, we emphasized the autonomy of the student. What we were trying to teach mattered less than what students were motivated to learn. But the data. This presented a new, peripheral value point that mirrored the growing reliance in the technology community around “big data” and automation.

In 2010, I sent an email out to a group of colleagues from around the world asking if they were interested in organizing a conference to explore how data can be used in learning processes – now known as learning analytics. After a successful conference launch, over the past decade, the field has developed rapidly as a research domain and increasingly, reflective of the kinds of tools and technologies that we bring into our classrooms and onto our campuses.

Blogs begat connectivism. Connectivism begat MOOCs. MOOCs begat learning analytics.

And now, in grappling with my unease about the future of education, I am eager to see a turn to the human. To the human student. To human learning. And to a human learning system.

To get there, we need to take a focused look at where we are and emphasize a move from talking of constant change - a narrative that has encompassed education for the last several decades - to one of talking of becoming.

In this presentation, I'll start by questioning technology. Do we have the digital infrastructure that we need to get us to where we want to go?

I will focus on questions related to our students. Who are they? What is our vital obligation to them, regardless of age?

And I'll address questions about the future of the human cognitive enterprise in a world where AI is forecast to be society altering. More accurately, a world where AI is NOW already society altering.

And I'll conclude by positing a new point of focus for our education system – a focus on *beingness* as a core human attribute and the role of universities to bring us closer to the things that matter. These things that matter have been mediated by technology, which in turn has produced a separation. I advocate for a return and that universities are the agents that enable this to happen.

### **What does technology do?**

Primarily, it extends us. Technology for things like tilling the ground extended our human physical limitations. An airplane extends our ability to travel. Today technology extends our mind. Or as McLuhan says, extends “our central nervous system itself in a global embrace”. Or Ernst Kapp's view, stated in 1877, that technology is a projection of our body.

Each extension, however, influences a core human attribute. Something is gained, but something is lost. Plato for example, argued against reading:

If men learn this, it will implant forgetfulness in their souls; they will cease to exercise memory because they rely on that which is written, calling things to remembrance no longer from within themselves, but by means of external marks.

Arthur C. Clarke stated that any “significantly developed technology is indistinguishable from magic”. I'll add that any sophisticated integration between social and technological systems results in incongruity, even hypocrisy for end users. We gain. We lose. But it's contextual.

Mulla Nasruddin, sometimes called the Arab Aesop, captures this friction where something can be both good and yet carry less desirable elements:

Knowledge is like the carrot, few know by looking at the green top that the best part, the orange part, is there. Like the carrot, if you don't work for it, it will wither away and rot. And finally, like the carrot, there are a great many donkeys and jackasses that are associated with it.

Another way to look at technology is that it is essentially structured repetition. It does the same thing. Over and over again. With the same results. Technology structures us. It changes us. It technifies us.

I grew up in community with a radical view on technology. The Mennonites of northern Mexico traced their journey to find a safe community through Europe and into Canada. With the inclusion of mandatory school system in Canada, church leaders concluded that the country was no longer a safe spiritual place and large populations immigrated to Mexico. Since then, they have continued their move south – always driven by leadership who sees technology as sinful. I now count family in Paraguay and Bolivia as this sect of Mennonites seeks isolation from the advancing influence of technology. Technology was, simply, an agent that separated individuals from God. Technology was a corruption of humanity, not an extension.

But.

It's wonderful to be connected.

AND we are being surveilled. It's great to be able to participate in open conversations about things that matter to society. AND it's a toxic sludge of trolls. What matters most for consideration here, is that technology changes us. It changes our most human attributes.

It's not all bad. And it's not all good.

Let's consider it from the lens of learning.

**Our Students:**

The higher education system has become increasingly aware of the changing learner population. Most Western universities have gone through several key stages of student profiles. Following WWII, not unlike the challenges following the Roman wars, saw a return of a large soldier population to society. In the USA, this was met with the GI Bill, resulting in a growth in prominence for universities. Until this point, bachelor's degrees were achieved by [less than 10%](#) (figure 17) of the population. This resulted in a boost in university enrolment.

Universities fell into the new economic regime of “growth”. Campus investments were made, and new programs developed, that assumed perpetual growth. As the demographics alarm bell started ringing, universities turned to a new population: international students. Top systems globally remain heavily reliant on these students, but as developing countries improved their own education systems, for some countries, such as USA, university leadership have become concerned about what this might portend.

A few systems with visionary leaders, saw the longer-term prospects of digital or online learning. PSU, for example, was an early innovator, adding a digital layer to their on-campus offerings. Universities with poor leadership, ended up scrambling to catch up and had to outsource their core missions to OPMs and similar program partners. Online learning, however, wasn't a sufficient replacement to offset demographic decline and international student uncertainty (Australia is still riding this wave hard).

MOOCs revealed an enormous under-served population: adult learners needing to reskill for a changing economy. With gusto, vastly exceed by anything higher education could muster, startups saw a way in. Up until this point, vendors sold services to augment what universities did. Now an avenue existed to take over, or compete with, core services offered.

Universities are now starting to see value in this new opportunity – reskilling in the USA is a multi-trillion dollar problem, at least if we are to

believe forecasts of 30-45% of the existing jobs being automated in the next few decades.

We have two learner populations in the higher education system: the traditional 17-24 year old group, and the emerging lifelong adult learner group. We have failed both, but in different ways.

*What is our most vital responsibility to youth?*

Universities play many roles – preparation for the workforce, development of thinking skills, development as a person. Perhaps the most important role is one of preparing individuals for the future society that they will inherit. This preparation is not only cognitive. There are *beingness* attributes involved. The absorption of culture norms and values. And, in humanist traditions, a sense of agency and optimism.

Several months ago, as I was doing my daily dive into global anxiety and eschatological news: climate change, income inequality, global uprising. Societal inequality. My son was in the room, and like a proper member of the younger generation, lives on his phone. Whether on Reddit, SnapChat or TikTok, politics and climate change and economics seep into everything. I asked him, “what’s your take on the raft of negative news that you encounter everyday? Is it depressing?”.

His response has sat heavily with me. “I’m happy, but I’m not hopeful”.

The youth are angry and they are uprising. Greta has achieved what well-educated wealthy politicians have not been able to do. 41% of the world’s population is under 24. They are slowly taking control. We are not the ones with the answer. In spite of their agency, it’s a reluctance driven by the failure of previous generations to steward the environment and the economy. It is not a hopeful embrace: it is bleak, driven by a crisis of meaning; a crisis of hope.

Where shall youth find hope?

In the economy? I mean, clearly, no.

Will they find hope in religion? All indications are No. Participation, in Western countries, in organized religions continues its decline.

Ah, well, technology is our salvation then! No. At best, it is part of the problem. The utopian future promised from Silicon Valley increasingly looks nightmarish with constant video, surveillance, and manipulation by major technology companies and event state actors.

Surely education, that long proclaimed equalizer of opportunity and a pathway to a better future? Again, we turn to no. Our narrative is somewhat out of touch with this population. We are presumptuous and arrogant. Some of you are likely bristling at my attempt to deflate optimism. I'm presenting the emotional and value climate of today's youth. Sure, examples can be found of "feel good" exceptions that point to a small percentage who are able to create and navigate the existing system of society and learning to gain personal rewards. But let's be realistic. We are giving our students what we wanted and needed for the world in which we grew up.

Many of us in the education sector come from a place of stability and hope. We have irrational optimism because we have a background where a narrative of individual effort equates with success. The problem is not personal effort. The system is the problem.

We have failed youth by creating an education system that supports existing power structures in society and does so in a most pernicious way: don't go through us and you can't get a job. Go through us and become conditioned to existing systems and, heavily in the USA but also in numerous other developed countries, you will be locked into years, decades or even a life debt. This is a failure of purpose. A failure of opportunity. A failure of meaning.



We've failed adult learners in an entirely different way. We have failed them through lack of vision and lack of awareness of their needs. While many universities have continuing or distance education programs, they are misaligned to the needs of many adults. Consider the currently fastest growing field of employment with the highest starting salary: data science. Kaggle recently released a survey that states 59% of data scientists acquired their skills through MOOCs or through self-regulated learning. The now much misaligned MOOC is a supply side answer to decades long demand side increase in learning needs. Globally, MOOC providers are approaching 200 million students registered. This is significant. I'd argue, one of the most significant education trends of our generation. Many of us like to whine about the pedagogical model of MOOCs, but for many people in developing regions of the world, it's a decision about access to learning. Or not.

### **The role of teachers**

The life experiences of students have undergone a significant transformation due to the development of digital technologies.

For learners, social media has been augmented by a range of options for learning: YouTube, LinkedIn, Khan Academy, MOOCs, and too-many to list education technology startups – Crunchbase lists over 3300.

Achieving centralized aims through decentralized means produces uneven outcomes at best. In the more innocent and joyous days of web 2.0, blogs, wikis, podcasts, and RSS provided an infrastructure based on autonomy and control. The power shifted, in educational settings, from the teacher to the learner. A new age of learning was upon us. DIY education! You can learn anything that you want to and you no longer need institutions or even teachers!

Reality has proven to be more elusive. Much like social media has revealed itself to have dark and damaging sides – false information, toxic conversations – the world of self-directed learning presents its own challenges.

It appears that we still need teachers. The role of teachers is different in a setting of rapid and pervasive change and information abundance than in climates of stability. We have technified our curriculum – structured, organized, methodical. We have technified our instruction: scheduled, lecture based, assessment-focused.

Research, such as Scott Freeman’s work from University of Washington, clearly indicates that learners perform significantly better through active learning than through lecture-based learning. For attendees of this event, and the ICDE community in general, this isn’t new information. We’ve long known the value of adult learners and self-regulation and authenticity of learning activities.

Learning is complex and dependent on the context of the learner. Social media is good AND bad for society. Giving learners full control produces good AND negative outcomes.

There is a developmental aspect to education that matters as much as access. The role of Twitter, YouTube, and Facebook in giving voice to narratives that many in society hoped were permanently in humanity’s past, can’t be ignored. Accessing ideas is not the same as coming from a position of values and principles.

Another concern arises in that learning is a coherence forming process and networks are fragmentary. This fragmentation provides serendipity AND it produces knowledge frameworks that often don’t cohere. This results in an effect called the Illusion of Explanatory Depth. This is the appearance of understanding but on even slight questioning, it becomes apparent that the knowledge pieces don’t fit. The term was coined in response to Rebecca Lawson’s work out of University of Liverpool where she demonstrated students had a “sketchy and shallow” understanding of everyday objects.

Decades ago, a similar concept was noted in *A Private Universe* demonstrating that rigorous testing environments where students learn to

answer questions but fail to understand the underlying concept relatedness, are deceptive in that learners learn to jump through the testing hoop, but when they leave a classroom, even graduate from Harvard, they have deep misunderstandings of scientific concepts such as why seasons occur.

This is all good news for teachers – whether in a classroom or online. It means that guiding students through unstructured and chaotic knowledge spaces and modeling ways of being in relation to ambiguity remain vital. So too does the role of an educator in asking questions, interrogating the coherence of a learner’s knowledge

### **Human and Artificial Cognition**

AI is an attempt to make technology biological – to imbue it with the cognitive prowess of humans. As Susan Sontag states, “The leap is from writing by hand to the typewriter. From writing with a typewriter to using a computer is no leap at all.”

Similarly, the leap to AI is no leap at all. The leap to computers in the first place as these were the devices that technified human existence and increasingly, learning and knowledge development.

The term AI gets thrown around like everyone knows what it is. But it’s often misunderstood or over promised. It means so much and in education, actually so little. We haven’t seen many significant AI tools for broad or even transformative impact on learning. And the ones that we have seen often address a small part of learning - such as reading or chat bots or automated tutors. While Watson promised us the world, we have received, at best, a blade of grass.

There is, however, significant change coming. The sheer VC resources and national strategies in advancing AI make it inevitable that AI will become a mainstay of our daily lives and our classrooms.

To ensure that we can discuss this in a focused way, I'm going to address it from the lens of cognition. The unfolding future is not one of AI fully taking over human function, but rather taking over those cognitive processes that we have either technified or that are uniquely aligned to artificial agents.

Cognition has three elements: sensory, cognitive processes, and integrated cognition. Sensory aspects of cognition involve sight, sound, taste, smell. In some ways, our body is a mechanism for getting information into our brain. As Pirolli and Card have stated, we are information foraging beings. Our brain craves information. Cognitive processes involve things like working with concepts in short term memory and moving to longer term memory. And thirdly, integrated cognition involves creativity or applying conceptual understanding to generate novel outcomes.

For philosophers, psychologists, and computer scientists, we're starting to confront questions around what makes us uniquely human. Electronic Freedom Foundation has published an AI measurement index. Artificial cognition can outperform humans on a range of sensory and basic cognitive processes. It can recognize the presence of cancerous tissue more accurately than many human doctors. It can defeat expert humans at the most complicated strategy games that we have been able to produce. It can recognize patterns in large research paper data sets that human researchers were unable to recognize. And this doesn't include the computational and modeling capabilities for tracking climate change. Or Google's recent, controversial, Sycamore achievement of "quantum supremacy" where it calculated, in 3 ½ minutes, what would have taken the Summit supercomputer 10,000 years.

What does this mean for us?

Well, it suggests that the cognitive domain of human exceptionality on earth may be short lived. It means that we are hurtling toward a future where we will have artificial agents in our daily lives. Specifically, it means that we will have artificial cognitive agents in our social networks, our learning

networks, in our work lives, and in our personal lives. Our cognition will be distributed and embodied in agents that are not human.

And someone is going to have to design for this. Learning design will not only be confined to designing learning experiences, but to cognitively breaking down knowledge and knowledge work tasks so they can be assigned to human or artificial agents and then creation of integration of tasks and points of handoff between human and machine.

What is the implication for this on our systems of education? Especially ones where we are attempting to advance a narrative of meaning and hope?

### **Post Learning**

Now I'm going to get a bit weird as I detail the implications of technology, new types of learners, growth of human and artificial cognition, and the changing role of teachers.

“Learning” is too broad a term. We need better precision in order to tease apart the exact roles that we will play and those that the machines will play. Does having a conversation and “learning” that a friend is pregnant the same thing as learning calculus? Does learning how to flag a taxi in a foreign country involve the same cognitive processes as learning a new language? Clearly these are different activities and involve different regions of the brain. But we talk about it like it's all the same. Essentially, we are imprecise in our use of “learning”. It's like having only the word “food” to describe what we eat. No differentiation between garlic and chocolate. Eggs and watermelon. We will need to become more precise and intentional as we start to share tasks with machines.

We are entering a post-learning era. One where we think and learn with machines. Where we are co-agents in knowledge work. Where key human cognitive tasks are off-loaded to the artificial agents. Where *what we know* is less important than how we are connected for ongoing knowledge development. Where attributes of collaboration replace attributes of

individual performance. And where sensemaking, meaning making, and wayfinding become primary knowledge activities

This is my eight-point logic to support the assertion that we are in a post-learning era:

1. Learning is an innate constant human activity. We cannot NOT learn
2. Historically, humans have created institutions that reflect what is possible with the information technologies that were available.
3. As information quantity increased, additional systems were developed to capture and share information to the next generation (classification schemes (Linnaean, encyclopedias) and institutions to share that information (i.e. universities, schools, corporate settings).
4. With innovations around information generation and global connectivity, existing mechanisms for sharing the scope of human knowledge with the next generation appear inadequate
5. In response, data science and analytics have developed to organize and gain insight into this new scope of information, building on advanced computational capabilities
6. While analytics have enlarged the scope of human's ability to understand large quantities of information, a secondary and more significant trend is emerging that begins to overlap with human cognitive: artificial intelligence
7. AI, in learning settings, increases the sophistication of what is possible cognitively, outperforming humans in many learning tasks. This raises questions about how to balance human and artificial cognition and which domains of human cognition cannot be duplicated by technology
8. If machines can outlearn humans, and increasingly, don't have the challenge of passing the scope of information to the next generation, humanity needs to consider the relationship with data and with learning, essentially, the entrance of a "post learning era".

**A post learning era is one where traditional learning is better performed, or exceeded, by technology and existing institutions are inadequate for the learning task needed.**

The need for humans to make meaning or sensemake then becomes the critical need for individuals. Essentially, people cannot outperform the cognitive and information management attributes of technology. Our continued “relevance” then becomes one of building systems and institutions that promote sensemaking (integrating and connecting information into coherent narratives) over learning. The of this transition are enormous and put pressure on how we use technologies to create meaning and value.

There are activities that artificial cognition can do far better than what humans can do. With colleagues in Australia at C3L, we are focusing on how human and artificial cognition impact knowledge production and society. We are struggling to find which uniquely human attributes we, as a species, will retain.

### **Beingness**

I want to turn now to a final fuzzy concept. One that I’ve been thinking about for many years, but that is slowly starting to develop clarity as society co-evolves with technology and where tension points become more animated between the human and the machine. Much of what happens in higher education is not knowledge based. While we might “learn” things, our development as critical thinkers or more broadly, as citizens, is the fundamental attribute of a graduate. We don’t so much have the knowledge of a teacher or lawyer or doctor, as we become them. Education is more ontological than epistemological. Our advantage over artificial agents may rest in culture. Humanity stores its most significant knowledge advances in culture. Cicilia Heyes describes this cultural knowledge under the umbrella of cognitive gadgets.

Numerous books and papers recently have turned to so called future skills. What do students need to possess, in skills and mindsets, to be successful

in tomorrow's world. Often, these lists include vague concepts like complexity, navigate ambiguity, collaborate with others, and engage in multi-cultural.

My interest here is to disabuse educators, as a collective, of myths about what our learners need and the arrogance of our assessment that the future is knowable to us in the same way that it was knowable to past generations. I can stack cliché on top of cliché here - future prepared learners, constant change, half-life of knowledge, 21st century skills.

But can we pause for a moment and acknowledge that we're mostly full of shit? That when we and the conference keynote pundits get it right, it's a function of luck? That we are wrong more often than right? That Second Life didn't change higher education? That game-based learning didn't work?

Remember Thrun's 10 universities? Christensen's ½ universities closing? Or Druckers prediction about higher education?

We don't need to accept any future as inevitable. We don't need to accept that there is only one future for AI. We are right now in a loop where technology creates problems that only more technology can solve. We have been in this loop since early humanity. But it is one that is destroying our planet. And our soul. But it's hard to step out of this environment because its pace leaves little time for thoughtful reflection. I appreciate the thinking of Kate Bowles who advocates for consideration of implications of what exists in our society and in our universities.

We live our daily conversations discussing what's changing. Our attention needs to turn more to what we are becoming.

We are separated from what matters. We don't see the chicken that gave its life for our chicken tenders. We don't see the people we hurt online when we drop a rude or snarky comment.



I spent the first six years of my life on a farm in Mexico, just outside of the city of Cuahatemoc. I had a direct relationship with the things that sustained me. No electricity. No air conditioning. When it was time to make noodle soup, we would go to the chicken coop, select a chicken that we had been feeding since it was born. And kill it. And make soup. There is a dynamic of *closeness* in these types of actions where there is limited separation, limited mediation of life and life's experiences.

This stuff is messy and will continue to be messy. Morals, principles, values. These are not the things we often like to hear on our campuses. They are controversial. They are political. They even have spiritual or religious tones attached. For some, they represent a type of "churchification" of higher education. But as we confront who we are becoming through our growing reliance of technology, the existential threats of climate change and AI on the horizon, this is a road that we will need to walk as educators.