

Nurturing the Next Generation of Discoverers, Creators and Thinkers (script)

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<http://www.thecenterweb.org/files/essa2018program.pdf>

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Introduction

Over 154,000 babies are born in Illinois each year. By the end of my talk today, 10 children will be born. These children will graduate high school in 2036.

Imagine the kind of world these children will inherit.

How do we prepare them for this future world?

Consider just three exponential technologies that are affecting us today and imagine where these technological improvements may be in the year 2036.

The **first exponential technology** that I want to discuss is **autonomous or self-driving vehicles**.

Already 28 states have considered 98 bills related to the general topic of autonomous vehicle.

Self-driving vehicles pick up and drop off persons in several cities, such as Boston, Pittsburgh, and Phoenix.

Embark, founded in 2016, is a company of self-driving semi-trucks that started shipping refrigerators (Frigidaire) regularly from Texas to a distribution center in Southern California.

They recently completed a coast to coast 2,400 mile 5-day trip from California to Florida.

This exponential technology, autonomous vehicles, will not only disrupt jobs (truck and taxi drivers), but it will also have implications for car insurance, for car ownership, for when, or if people will get drivers' licenses.

What about the implications for parking, commuting and suburban living?

A second exponential technology is additive manufacturing, or 3-D printing.

How many remember dot-printers? (No printers...Kinkos copier services).

Then, faster printers came, laser printers after that and all of us became publishers.

The impact that laser printers had on self-publishing and our office lives during our life-time will be child's play compared to the impact that additive manufacturing will have as 3D printing becomes as ubiquitous as laser printing.

Additive manufacturing technology is now being used creatively to make everything from jewelry to fashion to aerospace—they have already 3D printed jet engine parts.

You might already know how this technology is being used medically to create dentures, bones and even human organs and body parts, such as limbs and vascular systems using groundbreaking 3D bioprinting techniques.

Today 3D printing advances are already achieving remarkable things how much more disruptive will this exponential technology be **by 2036!**

In 2014, for example, surgeons in Britain used 3D printed parts to reconstruct the face of a motorcyclist, Stephen Power, who had been seriously injured in a road accident.

In October of last year, a 20-year old woman, Penelope Heller, was fitted with a custom 3D-printed sternum and rib cage at the New York-Presbyterian/Weill Cornell Medical Center. She suffered from a rare bone cancer.

And just last month in January, scientists in China printed ears for 5 children who had a condition called microtia in which the ear is underdeveloped.

This was a cosmetic surgery since this 3D-printed ear was not functional/could not hear.

What jobs will be created because of this exponential technology? What are the ethical implications of 3D printing?

What if every person on the planet, no matter their country, socio economic status, political affiliation everyone in the world, had a powerful 3D printer that could print: clothes, food, currency/money, body parts, weapons?

The last **exponential technology** that I want to mention is **Artificial Intelligence or AI**, which is quite popular thanks to Hollywood and the media.

You may know **Jarvis** (from Iron Man).

Jarvis (stands for **Just A Rather Very Intelligent System**) is a highly advanced computerized AI developed by Tony Stark, to manage almost everything, especially matters related to technology in Tony's life.

AI is gaining traction as the Internet of Things grows.

IoT is the merging of hardware (i.e., appliances) with sensors connected to cloud services that exchange data. Think Alexa? Amazon's Echo? TESLA cars.

In 2016, Mark Zuckerberg, Facebook founder, built his own version of an advanced AI.

He called it "Jarvis" to run "my home and help me with my work."

Have you heard of the AI robot that passed a college entrance examination?

The Todai Robot was able to write a 600-word essay on maritime trade in the 17th century that was good enough to meet college entrance criteria.

Noriko Arai, AI expert and member of the team that built the robot, explains in her TED Talk [Can a Robot Pass a University Entrance Exam?](#) that this wasn't because it possesses intelligence, but rather because it recognizes key words.

"Our robot took the sentences from the textbooks and Wikipedia, combined them together, and optimized it to produce an essay without understanding a thing," Arai says.

What can Todai Robot not do: discover, create, find meaning.

One last thing to show you how crazy interesting it's getting with AI, in October 2017, a humanoid robot developed by Hanson Robotics named Sophia was granted citizenship in Saudi Arabia.

Sophia made history by becoming the first AI to gain citizenship.

What knowledge do we teach our students in a world where Google knows everything?

And how do we create equitable access to this knowledge (Google) when not all households have access to the internet?

What skills do we teach our youngsters given our future world; I would argue our present world?

What do our children need to learn now for a future that is exiting, frightening, and unpredictable?

And in case you don't get a sense of urgency imagining the world of 2036 for children born today, let me remind you that the class of 2031 is already in our schools.

They're today's kindergartners.

When my grandson, Malachi, was born in the year 2000, I made a little "onesy" for him.

On one side it had a graduation cap and the "Class of 2028" and on the other side a graduation cap and "Class of 2032."

I was trying to plant the seed that Malachi would graduate from high school in 2028 and from college 2032, if college was still a 4 year program.

I thought that this was such a long time in the making...Malachi is already in 2nd grade!

Transition #1:

If you've tuned out, tune in.

In the next 25 minutes, I hope that you will leave this ballroom with a clear picture of three people who can serve as icons of how you can nurture the next generation of discoverers, creators, and thinkers.

To deliver on this promise, I need your help with a little experiment.

I promise that it won't hurt you and it will only last about 25 minutes.

Would you be willing to participate in this experiment?

Yes?

Ok. I would like for you to put away your smart phones, I-Pads, all access to social media.

You'll understand why I'm asking you to do this toward the end of my talk this morning.

Thank you for your assistance.

As I was saying...In the next 25 minutes, I hope that you will leave this ballroom hall with a clear picture of three people who can serve as icons of how you can nurture the next generation of discoverers, creators, and thinkers.

I wish I had a hologram to introduce you to these three...perhaps at next year's conference...

As you meet these three and consider how we can nurture the next generation of discoverers, creators, and thinkers, keep in mind Eric Hoffer's assertion,

"In times of change, learners inherit the earth, while the learned find themselves beautifully equipped to deal with a world that no longer exists."

#1 Illustration / proof: Ria Persad is an example of a discoverer, an innovator, a divergent thinker.

Let me introduce you to Ria. This is where her hologram would appear.

Ria serve as our first icon of a discoverer.

Ria the discoverer! (Like Dora the explorer!)

Ria Persad is 44 years old, born on June 18, 1974, in Trinidad and Tobago.

She's of East Indian descent and moved to the United States as a small child.

Ria's professional success is rooted deeply in her personal experience in school and with teachers.

Teachers made the difference!

When she was 12 years old, a teacher identified that Ria had a special talent in mathematics.

The teacher showed Ria a picture of her school's math team captain who was accepted to study mathematics at Harvard.

Guess what happened: Several years later Ria became captain of her school's math team.

And, yes she also studied at Harvard!

Ria says, "up to that point, I really had no vision for my life, but this teacher built a vision for my life at a time when girls were seldom encouraged in mathematics. "

Later, when Ria was in 8th grade, a science teacher told Ria, "Ria, promise me that you will never give up the piano.

Keep playing it, because when you become a great scientist someday, you will rely upon the creative side of your brain to make discoveries and solve problems."

Ria says, he couldn't have been more right.

Innovation comes from the creative side of the brain.

So does problem solving.

Ria says that we are right to think that math and science are analytical, but once you put them into practice, the right hemisphere is what gets engaged, because we're trying to invent things, to see the world in a different way, to come up with solutions that nobody's thought about.

Ria studied mathematics and physics at Harvard, Princeton, and Cambridge.

She is a mathematician, a classical pianist, a composer and author, and a fashion model.

Ria is founder and CEO of StatWeather, a corporation specializing in state-of-the-art weather prediction systems for the risk management industry.

Ria has been recently recognized by Platts Global Energy Awards as one of the top 7 global leaders for Lifetime Achievement and as the International Power-Gen and Renewable Energy Woman of the Year.

Ria attributes her success and accomplishments to her determination, hard work and willingness to take risks.

Ria's favorite quote or motto is, "I am what I am, not because of what I am. I am what I am, because of what I believe."

Sometimes you accomplish things because you simply didn't know that it was "impossible."

Ria says that when she founded StatWeather, it was on the premise that the weather could be predicted three months to one year in advance.

It seems preposterous, but if you think it's possible, pretty soon you just might figure it out.

#1 Premise: As we leave Ria's hologram, and move on to the next icon, I want to emphasize that Ria serves as an example of a discoverer, who innovates and takes risks.

She demonstrates some of the most important skills and predispositions necessary now and in the future:

- Divergent Thinking
- Complex problem solving--critical thinking

By the way, these skills are enhanced by bilingualism!

Dual language instruction helps our students to gain diverse perspectives, enhancing their critical thinking skills.

Conclusion #1:

Ria is an example of a discoverer—someone who innovates, she was prepared by teachers who mentored her and inspired her to work hard. These conditions, inspiring teachers, mentorship, and hard work can be available for all of our children; all of your children.

Would you agree?

Transition #2:

In a world where labor cycles are accelerating, the question is, what are the foundational literacies, competencies, and character qualities that we need to teach the next generation so that they can keep pace?

To address this, some schools have started teaching coding and other skills relevant to the technologies of *today*.

But technology is changing so quickly that these new skills may not be relevant by the time students enter the job market.

In fact, in Cathy Davidson's book, Now You See It, Davidson estimates that,

“65 percent of children entering grade school this year (2011) will end up working in careers that haven't even been invented yet.”

So, what do we teach?

How do we nurture the next generation of creators?

I propose to you that the most important jobs of the future in addition to requiring people who can “discover and innovate” will also require a creative mindset and curiosity.

#2 Illustration / proof:

Let me introduce you or reintroduce you to our next icon—our icon of a creator--Leonardo DaVinci, who before he was a famous Ninja Turtle, was an artist and a scientist?

Just as Ria served as our icon of a discoverer, Leonardo serves as our icon of a creator.

Leonardo the creator!

Again, I wish I had a hologram to show you Leonardo!

Among his paintings, the [Mona Lisa](#) is his and, perhaps, the worlds, most famous portrait.

[The Last Supper](#) is the most reproduced religious painting of all time.

And his drawing of the [Vitruvian Man](#) is a pen and ink drawing that shows a man in two positions with his arms and legs in a circle and a square.

It's definitely a [cultural icon](#), being reproduced on items as varied as the euro coin, textbooks, and T-shirts.

Walter Isaacson, author of many biographies, including [Steve Jobs](#), [The Innovators](#), [Einstein](#), etc., just published a book on [Leonardo daVinci](#).

As many of you know, Leonardo was an Italian Renaissance inventor, painter, sculptor, architect, musician, mathematician, etc.

What you might not know is that he was born to a single mom.

While he was a great painter, he is also credited with the invention of the parachute, and the helicopter, among other inventions.

The new book advocates for teaching using interdisciplinary studies: teaching creativity, science, music, math and liberal arts, not just STEM subjects in an isolated manner.

Listen to the way that Walter Isaacson begins his November 2017 article in *The Atlantic*, "Leonardo da Vinci liked to think that he was as good at engineering as he was at painting, though this was not actually the case.

The basis for his creativity was an enthusiasm for interweaving diverse disciplines.

With a passion both playful and obsessive, he pursued innovative studies of anatomy, mechanics, art, music, optics, birds, the heart, flying machines, geology, and weaponry.

He wanted to know everything there was to know about everything that could be known.

By standing astride the intersection of the arts and the sciences, he became history's most creative genius." (P. 51)

In one word, I would say that Leonardo was curious, which is one of the character qualities necessary to fully engage in the future.

Our worldwide levels of curiosity are at an all-time low.

In a 2016 study, [The State of Curiosity in our World](#), 80% of workers agree that curious co-workers have more ideas, yet only 20% considered that they themselves were curious.

How can we increase, develop, and retain our curiosity when attention spans seem to be shrinking.

The state of curiosity report defined curiosity as inquisitiveness, creativity in problem solving, openness to other ideas, and distress tolerance (the ability to meet the unfamiliar with bravery rather than anxiety).

I love what the Museum of Science and Industry, a great resource for those in the Chicago – Metro Area, says about curiosity.

They say...

Curiosity needs to make a major comeback.

We need it now more than ever.

We need to protect it.

Help it grow and thrive.

Curiosity is what drives society forward.

It is the lifeblood of all human progress.

The MSI encourages us to ensure curiosity does not become an endangered species in our lifetime.

#2 Premise

Curious creators innovate!

They bring new things into existence.

As Leonardo's hologram vanishes remember him as our icon of a creator!

Conclusion #2

Lenoardo serves as an example of a creator...he was born to a single mom, was curious about everything, gaining expertise in science and the arts.

His science made his art better!

His art made his science better!

He brought new things into existence.

He worked hard and had an insatiable curiosity!

These traits are traits that are available for all of our children; all of your children.

Wouldn't you agree?

Transition #3

Why don't we have more Ria's or Leonardo's running around in our world?

How can we create the conditions to nurture more discoverers, creators, and thinkers in our schools?

One huge obstacle is that we spend too much time in front of the screen.

And now you will find out why I asked you to put away your smart phones and devices!

Last week on February 4, the NYT ran an article about former Facebook and Google employees.

The article describes a group of early employees of Facebook and Google who have banded together to raise the alarm of the ill effects of social networks and smartphones.

The Facebook/google geeks are launching a new \$7M campaign, The Truth about Tech that is aimed at students, parents, and teachers warning about the dangers of technology, including the depression that can come from heavy use of social media.

Did you know that many in the tech world, including Tim Cook, Apple's CEO, won't let young family members on social media?

According to the Center for Humane Technology, there's an invisible problem that's affecting all of society.

Facebook, Twitter, Instagram, and Google have produced amazing products that have benefited the world enormously.

But these companies are also caught in a zero-sum race for our finite attention, which they need to make money.

They use AI, data science and robust algorithms to continually learn how to hook us more deeply—based on our own behavior.

Unfortunately, what's best for capturing our attention isn't best for our well-being:

Snapchat turns conversations into streaks, redefining how our children measure friendship.

Instagram glorifies the picture-perfect life, eroding our self-worth.

YouTube autoplays the next video within seconds, even if it eats into our sleep.

These products are designed to addict us using similar techniques as those found in Las Vegas casinos!

The race to keep us on screen 24/7 makes it harder to disconnect, increasing stress, anxiety, and reducing sleep.

The race to keep children's attention trains them to replace their self-worth with likes, encourages comparison with others, and creates the constant illusion of missing out.

People always worry that new technology will harm society. Three forces make today different from anything in the past, including TV, radio, and computers:

1. No other media drew on massive supercomputers to predict what it could show to perfectly keep you scrolling, swiping or sharing.
2. No other media steers people to check their site 150 times per day – from the moment we wake up until we fall asleep. You know who you are! I can see some of you going through withdrawals because of our little experiment! Some of you are sweating!
3. No other media used a precise, personalized profile of everything we've said, shared, clicked, and watched to influence our behavior at this scale.

#3 Illustration / proof:

The final hologram that I would have liked to appear before you today is that of our final icon of a thinker: Cal Newport.

Cal is our icon of a deep thinker.

He is a prolific author and researcher who has risen through the ranks of academia in record time because he actually practices what he preaches.

Cal is an Associate Professor of Computer Science at Georgetown University, who specializes in the theory of distributed algorithms.

He earned his Ph.D. from MIT in 2009 just 5 years after graduating from Dartmouth College in 2004.

In addition to studying the theoretical foundations of our digital age as a professor, Cal also writes about the impact of these technologies on the world of work.

In his most recent book, Deep Work, Cal argues that **focus** is the new I.Q. in the knowledge economy.

And those individuals who cultivate their ability to concentrate without distraction will thrive.

In Deep Work, Cal argues that one of the most valuable skills in our economy is increasingly rare—the ability to think deeply, concentrate, and focus.

Deep work is the ability to focus without distraction on a cognitively demanding task.

It's a skill that allows you to quickly master complicated information and produce better results in less time.

Cal says that deep work is like a “**super power**” in our increasingly competitive twenty-first century economy.

And yet, most people have lost the ability to go deep—spending their days instead in a frantic blur of e-mail and social media.

An interesting story in the book is that of a social media pioneer buying a round-trip business class ticket to Tokyo to write a book free from distraction in the air—

So what is deep work?

Work that is exhausting since it demands your full time and focus; also deeply rewarding professional work that requires your full attention; it pushes your abilities, both analytical and creative, to their maximum (those of you who are NBCT...it’s that kind of reflective work!)

Here are three quotes from the book that illustrates Cal’s teaching

1. Two core abilities for thriving in the new economy: 1. The ability to quickly master hard things; 2. The ability to produce at an elite level, in terms of both quality and speed.
2. To simply wait and be bored has become a novel experience in modern life, but from the perspective of concentration training, it’s incredibly valuable.
3. Efforts to deepen your focus will struggle if you don’t simultaneously wean your mind from a dependence on distraction.

Shallow work, on the contrary, is work you can do automatically, even while you are distracted.

It doesn’t ask much of your attention and results in little new or valuable contributions.

Cal recommends that we

- Work deeply. Increase our focus by removing distractions
- Embrace boredom. (I’ve tried to help you with my boring keynote!)
- Quit social media. Benefits outweigh the costs

Deep work is meaningful, fulfilling, and creative—

It’s a skill required to be competitive in the future.

#3 Premise: Deep thinkers, like Cal Newport, spend a lot of time in deep consideration.

The deep thinkers’ mantra is “focus.”

And with our last icon, Cal the thinker, our hologram vanishes.

Conclusion #3

Cal Newport demonstrates that thinkers spend time on deep considerations; they learn to focus and minimize distractions.

These traits of focus, concentration, and getting rid of distraction are necessary for all of our children; all of your children.

Would you agree?

The bottom line is we need to nurture the next generation of discoverers, creators, and thinkers...because, we need to

- Prepare students for jobs that don't exist
- Using technology that has not been invented
- To solve problems we have not yet confronted

Transition to conclusion

As I wrap up, I would not be doing my job if I didn't ask you to imagine your specific role in developing the next generation of discoverers, creators, and thinkers.

I believe that each of us needs to engage in effective leadership practices.

In teaching, we know that teachers of reading must read and teachers of writing must write to show students that the teachers themselves are readers and writers.

What must you do to nurture the next generation of Discoverers?

What must you do to nurture the next generation of Creators?

What must you do to nurture the next generation of deep Thinkers?

What you **do** speaks so loudly that your students, employees, and followers can't **hear** you.

They **see** you before they **hear** you.

They emulate what we **do**, not what we **say**.

The problem with our kids/students/followers is that they **do** what we **do** rather than what we **say**!

Let me end with one of my favorite poems...that speaks about the importance of the journey...since we're on a journey to nurture the next generation of discoverers, creators, thinkers, **we** must become discoverers, creators, and thinkers ourselves.

Antonio Machado said it best.

Caminante, son tus huellas

el camino y nada más;

Caminante, no hay camino,

se hace camino al andar.

Al andar se hace el camino,
y al volver la vista atrás
se ve la senda que nunca
se ha de volver a pisar.
Caminante no hay camino
sino estelas en el mar.

Wanderer, your footsteps
the road, and nothing more;
wanderer, we have no road,
we make the road by walking.
As you walk you make the road,
and to look back
is to see that never
can we pass this way again.
Wanderer, there is no road,
only traces in the sea.

You may now take out your smart phones and devices! The experiment is over.

Thank you!