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## STERLING KEYNOTE

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# The Practicality of an Impractical Education

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Neil deGrasse Tyson, Astrophysicist and Director of the Hayden Planetarium, reminds us that “Art and Science have defined civilization since the beginning of time.” Biologist and Naturalist, Edward O. Wilson’s observation enfolds an explanation: “Although the two great branches of learning, Science and the Humanities, are radically different in the way they describe our species, they have risen from the same wellspring of creative thought.”

The current fascination with the STEM disciplines is to be expected in a technological and digital age, but supporting STEM at the expense of the Liberal Arts and Humanities ignores half of human thought.

While I embrace the idea that study in the Liberal Arts and Humanities contributes to intellectual growth, I am aware of complaints that asserting that the Liberal Arts and Humanities develop creativity, critical thinking, and mental flexibility is elitist. Therefore I seek a common ground by posing four questions.

1. How does study in the Liberal Arts and Humanities develop intellectual growth?
2. Do thinking skills gained through Liberal Arts and Humanities become practical?
3. Why are the Liberal Arts and Humanities currently perceived to be irrelevant?
4. How can we reestablish relevance of the Liberal Arts and Humanities in the minds of the public?

**How does study in the Liberal arts and Humanities develop intellectual growth?** People enamored with STEM education accept a future based on robots and Artificial Intelligence, but designers of Artificial Intelligence examine human thinking processes to imitate them.

The initial and simplest form of Artificial Intelligence is known as “answers in a box.” Like the digital help on your computer, such programs answer the questions its designers anticipated; it is inflexible; it does not learn. Like a human provided with a procedure or protocol, it repeats what it has been told.

Recently, Artificial Intelligence scientists have moved toward a tipping point. A team at the University of Maryland designed a procedure to

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teach a robot how to learn. Using You Tube videos of people making salads, the robot was shown humans picking up a knife, slicing a cucumber, etc. The intent was for the Intelligence in the robot to learn to perform those acts as well as what to watch for, such as gauging the thickness of the slice and removing a stuck slice from the knife. Watching is one way human apprentices learn. Yiannis Aliomonis, a scientist with the project, explained that the team gave the robot a challenge to prepare it to figure out new motions when facing new tasks.

Nick Bostrom, Director of the Martin Programme on the Impact of Future Technology at the University of Oxford is cautious about Artificial Intelligence that can learn. In a TED talk Bostrom argued that when Artificial Intelligence is able to learn beyond managing human assigned tasks, technology could make choices for itself. When Artificial Intelligence makes choices, it will employ the values of machines rather than humans. Machines with Artificial Intelligence could then control humans as humans now control chimpanzees, because human brains have a fixed size and the neural pathways, used or unused, exist. The mechanism which runs Artificial Intelligence can be endlessly expanded.

Both Artificial Intelligence and humans employ pattern recognition and what Edward de Bono calls “lateral thinking”: transferring information or observations acquired in one set of circumstances to another context. For instance, when the much celebrated Hubble telescope initially provided only blurred images from space, Jim Crocker, Chief engineer for NASA, was told the lens had been ground too fine. The telescope needed glasses, but installing such a large item in space was impossible. Later, in his shower, Crocker observed multiple streams of water from the shower head coalescing into one and realized that small corrective lenses could be installed on Hubble to refocus the blurred images into one clear picture.

Crocker applied an observation made in one environment or pattern into another vastly different one. Artificial Intelligence still obtains residual information and the task information from humans. Both the need to teach robots to learn certain motions and the design of how to do so are human constructs. Artificial Intelligence does not yet think in abstractions or seek information.

Humans think with concrete information plus abstractions and higher levels of reasoning to make complex judgments--what Benjamin Bloom calls cognitive processing. The Humanities in particular consistently exercise skills of understanding, analysis, and evaluation. The Humanities also model and stimulate what Eric Brynjolfsson and Andrew McAfee (*The Second Machine Age*) call ideation and large frame pattern recognition, both illustrated in the solution to the Hubble problem.

In addition, the Humanities model stimulates inspirational thinking and communication. Simon Sinek, a motivational speaker, explains inspirational thinking through “the golden circle”: three rings represent, from the

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outside, “what,” “how,” and “why.” Ordinary thinking and communication starts with “what,” he says, because that is clearest to most people. It then moves to the “how,” but pays little attention to the “why.”

To Sinek the “Why” impulse originates in the feeling and reacting part of the brain and is clearest to inspirational thinkers like Martin Luther King or innovators like Steve Jobs. People like King or Jobs attract others because their ideas connect with the feeling and reacting part of other brains and appeal to impulses not expressed in language.

One of the world’s most innovative and inspirational thinkers, Leonardo da Vinci, recorded the practices that made him creative. In *How to Think Like Leonardo da Vinci*, Michael J Gelb abstracts them as: curiosity and continuous learning; testing knowledge through experience and learning from mistakes; refining the senses to enliven experience; tolerating ambiguity, paradox, and uncertainty; whole brain thinking that balances logic and imagination.

These practices increase breadth of experience and a variety of perspectives, offering increased pathways that accommodate lateral thinking. Growth in experiences and perspectives can be acquired through the Humanities.

Leonardo’s guiding principle is to understand your goals and aspirations and integrate them into your daily life. That is, being conscious of personal thinking processes and using information gained from the senses and emotions. These traits are not currently incorporated into Artificial Intelligence, so why does Nick Bostrom fear that Artificial Intelligence could become dangerous? He believes the expansion of the neural connections in the Artificial Intelligence machinery could become multiplied enough to allow a machine to learn beyond adapting motor skills for robots. It could think out of the box; that is: think beyond human designed and approved responses.

The Liberal Arts and Humanities long ago taught humans to think out of the box and encountered authority which sought to suppress thinking out of the box. In his drama *Prometheus Bound* the Greek dramatist Aeschylus redefined Prometheus’ offense to Zeus. Rather than confessing to the chorus that he gave humans fire, Prometheus says he taught humans the civilizing arts: writing, medicine, mathematics, astronomy, metallurgy, architecture, and agriculture. Aeschylus’ point seems to be that when humans gain self-sufficiency through rationality, they oppose attempts to control their thinking.

People who think out of the box have been punished for doing so. Socrates was one. Galileo’s scientific forefather, Giordano Bruno, was burned at the stake, and Galileo himself had to recant his statement that the earth revolved around the sun. The banning and burning of books in the 20<sup>th</sup> century focused on removing ideas that conflicted with certain agendas. Thinking out of the box can still unnerve your neighbors.

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## Do thinking skills gained through the Liberal Arts and Humanities become practical?

The foundation of innovation, analysis, and evaluation is flexible thinking dependent on a variety of perspectives. The diversity of experiences offered by the Liberal Arts and Humanities reduces the chance that one perspective or one response becomes habitual. The controlling power of learned responses has been illustrated by Dustin Sandlin, a cyclist and science blogger. When he was given a bicycle with reverse steering, a left turn of the handle bars turned the wheel right, he spent five minutes a day for eight months learning to master that new skill. Sandlin says that he knew what to do, but that his learned bias overrode the knowledge and that even when he acquired the new steering skills, any distraction would cause his brain to revert to old ways. When thinking with a variety of perspectives becomes the default mode, more choices present themselves, freeing the thinker from old pathways.

The Humanities offer what I call a “literacy of interpretation,” which is like looking at geologic strata or peeling the layers of an onion: one insight prepares for finding another. I would like to remind you how this works in fiction: A reader begins a narrative predicting the nature and likely pattern of the story. Soon those anticipations are confirmed or challenged by recognizing the author’s perspective, strategy, language patterns, and use of, or transformation of, known conventions. The most significant layer, the core of understanding, is what the poet Samuel Taylor Coleridge called “the willing suspension of disbelief.” That suspension occurs when the reader acknowledges that the narrative is not history, did not happen, but that it expresses truth. That agreement makes the reader co-creator, for as the narrative proceeds, the reader uses personal experience and understanding to validate the truth of the fiction.

The process of interpretation involves learning how to learn at an abstract level, for it requires challenging initial assumptions, developing interpretive criteria, identifying evidence, tolerating ambiguity, and a sense of empathy that leads to a perception likely shared with the author. How are these skills practical in our daily lives?

Skip Oppenheimer, a Boise business executive and civic leader, told an audience at Boise State University that broadly based skills are essential to success in business, for business decisions need to be made before all the facts are known. Technicians, he argued, want all the facts before they make a decision, but when all the information is known in business, it is too late to make a decision.

To tolerate the ambiguity and uncertainty of incomplete information, and act on it, requires the self-knowledge and confidence to predict patterns and invent responses. People who have acquired a variety of experiences and have deep knowledge of complicated concepts, who have de-

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veloped their own means of making sense of tangled information, and who have the ability to challenge their own analysis, editing out personal attitudes, have become critical thinkers and have acquired the confidence to be flexible thinkers. At any point in the decision process they know they have made the best possible choice based on the information available. That confidence also allows such decision makers to change their minds when new information alters their analysis.

If the end of higher education becomes preparation applicable to a vocation, training in various established boxes, protocols, and procedures will become the standard. But if the goal is broader, to prepare those who design the boxes, or if the employment preparation should be, as Drew Faust, President of Harvard University says, to help students “get ready for their sixth job, not their first job,” broad experience with thinking and communicating plus a literacy of interpretation derived from an education in the Liberal Arts and Humanities is very practical.

**Why then are the Liberal Arts and Humanities currently thought to be irrelevant?**

It may be as simple as that out of the box thinking has no meaning for people to whom it raises inconvenient questions or threatens cherished attitudes. People who understand the primary function of education, even higher education, to be vocational training do not perceive Liberal Arts and Humanities courses as more than electives. People making economic decisions about education may feel they cannot defend funding elective courses.

In *The Technology and Engineering Teacher*, Scott Bevins expresses the basis of these views. Students take humanities courses, he writes, for “non-specific interests without a concept of application.” The irony is that the skills of creativity, critical thinking, and mental flexibility become practical by being applied in situations or contexts not imagined until they occur. The potential to solve problems creatively can only be expressed when confronted with the problem.

The attitude cited by Bevins results in policies like that of Rick Scott, Governor of Florida, who told a talk radio host “we don’t need a lot more anthropologists in the state. It’s a great degree if people want to get it, but we don’t need them here. I want to spend our dollars giving people science, technology, engineering, math degrees. That’s what our kids need to focus all their time and attention on. Those type of degrees. So when they get out of school, they can get a job.”

The attitude led the Idaho Legislature to create a STEM Action Center, but there is not a corresponding Liberal Arts Center. It led a spokesperson for Asa Hutchinson, Governor of Arkansas, to say that learning computer code was today as important as learning to read used to be. Such people do not realize that thinking skills available for broad spectrum use are more valuable than targeted skills. While designers of Artificial Intelligence are developing thinking out of the box, the preference for learning code over

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reading returns human thinking to the box.

Student views of the Liberal Arts and Humanities may be shaped by media promotion of electronic experiences and consequently perceive the traditional Humanities as relevant to the past but irrelevant to a digital age and evolving future.

### **How can we reestablish the relevance of the Liberal Arts and Humanities in the public mind?**

In the digital age robots assume repetitive tasks, and electronic devices process information. Human nature and lessons about human nature, however, have not changed since Aeschylus wrote in the 4<sup>th</sup> century BCE. The relation between Zeus and Prometheus is replicated in every encounter between rigid authority and the rebel.

The good news is that technology is not monolithic. Scientists invent technologic projects and engineers produce them. Each has their own perceptions, needs, and skills. In addition, there are technologists who see technology assisting humans, and others who develop technology to replace humans. Those two schools also have different views, needs, and values.

There is considerable agreement among the inventors and entrepreneurs that the Liberal Arts and Humanities are essential to technology. The educational standards issued by the International Society for Technical Education include: creativity and innovation; critical thinking; problem solving; decision making; and Digital Citizenship.

The Liberal Arts and Humanities would seem to be useful in achieving these standards. Vivek Wadhwa, Director of Research at the Center for Entrepreneurship and Commercialization at Duke University, writes “It is commonly believed that engineers dominate Silicon Valley and that there is a correlation between the capacity for innovation and an education in mathematics and science. Both assumptions are false.” His recent research reveals many Silicon Valley people have degrees in the Liberal Arts and Humanities. Why? “Think of entrepreneurship as an art,” he says.

In *The Second Machine Age* Eric Brynjolffson and Andrew McAfee observe that today’s tech wave will result in routine tasks being done by technology, leaving humans to generate creative ideas and actions. That means we will need fewer tech people and more people oriented people.

In the August 25, 2015 issue of *Forbes*, George Anders discusses a LinkedIn study that shows the error of believing that Liberal Arts and Humanities people do not have a place in the technical world. Scientists working in technology depend on human innovation and creativity. That is why Steve Jobs said “it is in Apple’s DNA that technology is not enough. It is technology married with liberal arts, married with the humanities, that yields us the result that makes our hearts sing.”

It is also why Tom and David Kelley formed the d.school at Stanford University. The Design School, its full name, does not offer degrees;

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students drop in for a project. Acting on the belief that all people are creative but fear failure, the school puts together people from a variety of disciplines in situations which build the confidence to think out of the box.

An IBM survey of over 1,500 CEO's reported that creativity is the single most important leadership competency for enterprises facing the complexity of global commerce. That perception is reinforced by a report in the September 2013 issue of *Time* magazine that while Humanities education was being deemphasized in the United States, in some Asian countries, most notably China, the Humanities are assuming a more prominent role in educational programs because those countries recognize the need to be competitive in creativity,

In *An Astronaut's Guide to Life on Earth*, Col. Chris Hadfield writes that in preparing to go into space where there is no safety net, you must anticipate every possible situation and prepare by rehearsing responses again and again. The space capsule, however, is a defined environment; situations faced on earth are unlimited, and the best preparation is to become a flexible, creative, problem solver.

Still, Liberal Arts and Humanities students who seek employment might benefit from guidance. Their audience, most likely middle managers, may think in terms of plug-ins. English major / English teacher; Anthropology major / artifacts. Humanities departments might provide an opportunity, a job prep day, to help students analyze the requirements of advertised jobs, and figure how they might connect with them. Students could cite communication skills in general, writing, and point out that they learn quickly, like challenges, and solve problems.

As a Director of Internships I observed that aside from the value of the project, the internship educates students about the nature of the workplace and educates their supervisors about the skills of students in the Liberal Arts and Humanities.

I believe it is important to begin a dialogue with professionals in the STEM fields. If a university has a STEM committee, a person or people from the Arts and Humanities ought to meet with them to discuss interaction. A beginning might be projects that require the perspective of multiple disciplines. They would not have to be credit bearing nor a semester long. The initiative to cooperate might at least open lines of communication and encourage the STEM faculty also to think of connections.

Liberal Arts people could initiate a forum on common issues and invite STEM faculty to participate. For instance, Google has a team at work to replicate the entire range of human thinking including emotions. Success could validate Nick Bostrom's fear of machine takeover. A Forum topic might be potential side effects or how to avoid side effects. Another topic



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could be the long term effects of substituting electronic interaction for human interaction: electronic communication, robot pets and companions; a hotel staff with no humans could change our reactions to people.

Our culture acknowledges success in sports, the arts, business, technical innovation etc., but there is no public vehicle for celebrating the value of an education in the Liberal Arts and Humanities. To remind the public of the value of that education, the Dean of an Arts and Sciences college might sponsor an event recognizing people who have succeeded in a variety of fields because of their education in the Liberal Arts and Humanities.

A first step would be to solicit narratives from people who have experienced Liberal Arts and Humanities education which contributed to their success in fields other than the humanities. The fact of the recognition and the existence of testimony might improve the image of the Liberal Arts and Humanities as well as demonstrate their power as educational tools. Students do stop Liberal Arts and Humanities teachers at events or in the mall anxious to tell how their Humanities course(s) helped them succeed, but the stories never get on the street. "All truths are easy to understand once they are discovered," Galileo wrote. Our society would be healthier, and more creative, if it rediscovered the value of the Liberal Arts and Humanities.