

# From STEM to STEAM: The Future of the Liberal Arts

Kevin Kee

*The late Steve Jobs famously said, “It is in Apple’s DNA that technology alone is not enough—it’s technology married with liberal arts, married with the humanities, that yields us the results that make our heart sing.” While conventional wisdom dictates that today’s economy prefers STEM graduates, the University of Ottawa’s Kevin Kee presents a passionate case for STEAM.*

**M**y son Jacob is built for a Bachelor of Arts. Fascinated by what makes the world tick, he is interested in literature, communication, and environmental studies; math has never been, nor will it ever be, his “thing.” Nevertheless, as he contemplates how to spend his first four years at university, he feels compelled to study Engineering or Commerce. A Bachelor of Arts, according to some friends and teachers, will launch his career as a barista.

Jacob’s experience highlights a much larger issue. Canada needs more STEM graduates to remain at the forefront of technological progress—an argument I heard in the 1980s as I contemplated an undergraduate degree. But the conventional wisdom that science, technology, engineering, and mathematics equal ease with the tools of the 21st century while arts degrees do not is outdated, like the leg-warmers and popped collars of my teens.

Many liberal arts degrees now provide a well-rounded curriculum, and graduates are emerging with the soft skills that have symbolized the liberal arts—communication skills, critical thinking, creativity—as well as the ability to use computing tools and author code. STEM is becoming STEAM, arts being the inserted letter, which means Jacob will be able to use

his arts degree to tackle some of the biggest challenges of our day.

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**W**hat are those challenges? Beginning my BA program in the late 1980s, I faced a scarcity of information and limited access to resources, forcing me to spend long hours in the library, where information was centralized. Jacob’s biggest problem is not scarcity; with the Internet as his library, his challenge is seemingly limitless information.

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stoy’s War and Peace (about 1,250 pages) at least 323 trillion times. Although a good chunk of this is pure amusement, like cats playing pianos, the Internet also houses much that falls under the umbrella of “research material,” with newly digitized forms of traditional research being uploaded every year. Google Books, for instance, is working to digitize every book published in modern history (approximately 130,000,000 books, according to Google)—work that may be completed within our students’ lifetimes, if not our own. But as documents become more readily and cheaply available, problems emerge for researchers in every domain.

Consider the challenges exemplified in the work of historians today. Dan Cohen, executive director of the Digital Public Library of America, notes that if a scholar wants to write a history of the Lyndon Johnson White House, she has to read and analyze the 40,000 memos issued during Johnson’s administration. This will take time, but it is possible. A historian wanting to write about the Clinton White House has, in addition to conventional administration documents, four million emails to address. It is impossible to read these in one lifetime. The Bush White House has 200 million emails. With such data, how do historians write the history?

Researchers in government and business are facing similar challenges. Reviewing the literature available on any given subject is becoming impossible because the amount of information that is being created about a subject is accumulating faster than we can read and understand it. We are drinking from a fire hose.

Fortunately, liberal arts scholars are imagining and creating new ways of

doing research: ways that recognize we cannot read all sources, because there are too many of them; ways that use the power of computers and the connectedness of the Internet, through feed readers, feed aggregators, crawlers, spiders, and bots, to automatically find and synthesize web content into a single report; and ways that can create indices, build concordances, and synthesize documents to ensure the most strategic text mining (see, for instance, Western University professor William J. [Bill] Turkel's research methods). Such methods will help Jacob read all 200 million emails from the Bush White House, or research any other subject his professor or—some day—employer requires.

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The late David Foster Wallace told the story of two young fish swimming along, meeting an older fish swimming in the opposite direction. The older fish says, “Morning, boys. How’s the water?” The two young fish swim on for a bit but, eventually, one asks, “What the hell is water?”

In the 1980s, print to students like me was like water to fish: it was hard to imagine another way of producing knowledge. But for all that print offers, Jacob knows it is no longer sufficient. Almost all of us now use computers to facilitate our research, express our knowledge, and share it with others who, in turn, read and annotate it, on a screen.

Print also carries inherent limits.

Books and articles depict linear information well, but Bachelor of Arts programs are exploring additional media—digital maps, audio recordings, video reports, digital 3-D reconstructions—to convey knowledge for greater efficiency, accuracy, and interactivity. As a result, Jacob will be able to create and express knowledge in myriad ways.

When I was a student, the walls between the ivory tower and the “real world” felt thick. I researched and wrote in the privacy of a library or dorm room. In contrast, Jacob is a child of the Internet, a vehicle for both creation (at last count approximately 300 hours of video are uploaded to YouTube every minute) and relationship-building (every 60 seconds, almost 4.2 million “likes” are posted to Facebook). We live in what University of Southern California professor Henry Jenkins has called a “participatory culture:” lots of people connected with one another, creating content. And while much of it may be about musical cats, there’s thoughtful, important stuff in there, too: amateur science, fan fiction writing, citizen journalism.

James Paul Gee, a professor at Arizona State University, has called the producers of this kind of knowledge “professional amateurs:” citizen scholars who, though rarely credentialed or paid, are doing history, economics, or environmental studies because they love to. These curious, intelligent, motivated co-creators of knowledge are claiming expertise in areas where individuals and even groups of researchers might be lacking, and the social sciences and humanities—fields that explore culture, societies, and relationships—are especially fertile ground for crowd-sourcing knowledge.

Consider, for example, that within days of the 2013 Boston Marathon bombings, humanities researchers and students at Northeastern University created *Our Marathon: The Boston Bombing Digital Archive*, allowing citizens to add pictures, videos, stories

and social media about the attacks; the result is both a crowd-sourced memorial and a repository upon which we can analyze how citizens respond to, and can be supported through, a terrorist attack. Such work creates new audiences while allowing for an enhanced relationship among communities and researchers. After all, “experts” are no longer mysterious wizards hidden in ivory towers; liberal arts professors are especially skilled, especially knowledgeable, engaged participants in the “real world.”

In 2016, liberal arts professors at my institution, the University of Ottawa, and elsewhere, await students such as Jacob with courses and programs that respond to the challenges and opportunities of the 21st century. We continue to champion the values and practices that have defined our disciplines for centuries, while at the same time working with the computer tools of the present. We conduct both a close analysis of our sources in libraries, and a distant reading of vast datasets on the internet. We write articles that are published in print, but we also communicate via digital maps, audio, video, and other forms of digital expression. We craft understanding alone in our offices, and share the results through long-established media outlets, but we also create knowledge in networks, in partnership with citizen scholars.

This new STEAM paradigm will ensure that Jacob thrives. He will learn to be a critical and creative thinker, and to communicate well in person, on the page, and on the screen. He will build cultural understanding, so that he can make sense of our increasingly interrelated world, and act upon it in imaginative ways. And these skills and knowledge, augmented through his training in the computing tools of 2016, will help him succeed at jobs in business, education, the not-for-profit sector, or government, that may not yet exist. **P**

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