

“To Write Better Code, Read Virginia Woolf,”

by J. Bradford Higgs, *New York Times*, May 21, 2016

Mountain View, Calif. — THE humanities are kaput. Sorry, liberal arts cap-and-gowners. You blew it. In a software-run world, what’s wanted are more engineers.

At least, so goes the argument in [a rising number of states](#), which have embraced a funding model for higher education that uses tuition “bonuses” to favor hard-skilled degrees like computer science over the humanities. The trend is backed by countless think pieces. “Macbeth does not make my priority list,” wrote Vinod Khosla, a co-founder of Sun Microsystems and the author of a widely shared blog post titled “[Is Majoring in Liberal Arts a Mistake for Students?](#)” (Subtitle: “Critical Thinking and the Scientific Process First — Humanities Later”).

The technologist’s argument begins with a suspicion that the liberal arts are of dubious academic rigor, suited mostly to dreamers. From there it proceeds to a reminder: Software powers the world, ergo, the only rational education is one built on STEM. Finally, lest he be accused of making a pyre of the canon, the technologist grants that yes, after students have finished their engineering degrees and found jobs, they should pick up a book — history, poetry, whatever.

As a liberal-arts major who went on to a career in software, I can only scratch my head.

Fresh out of college in 1993, I signed on with a large technology consultancy. The firm’s idea was that by hiring a certain lunatic fringe of humanities majors, it might cut down on engineering groupthink. After a six-week programming boot camp, we were pitched headfirst into the deep end of software development.

My first project could hardly have been worse. We (mostly engineers, with a spritzing of humanities majors) were attached to an enormous cellular carrier. Our assignment was to rewrite its rating and billing system — a thing that rivaled maritime law in its complexity.

I was assigned to a team charged with one of the hairier programs in the system, which concerned the movement of individual mobile subscribers from one “parent” account plan to another. Each one of these moves caused an avalanche of plan activations and terminations, carry-overs or forfeitures of accumulated talk minutes, and umpteen other causal conditionals that would affect the subscriber’s bill.

This program, thousands of lines of code long and growing by the hour, was passed around our team like an exquisite corpse. The subscribers and their parent accounts were rendered on our screens as a series of S’s and A’s. After we stared at these figures for weeks, they began to infect our dreams. (One I still remember. I was a baby in a vast crib. Just overhead, turning slowly and radiating malice, was an enormous iron mobile whose arms strained under the weight of certain capital letters.)

Our first big break came from a music major. A pianist, I think, who joined our team several months into the project. Within a matter of weeks, she had hit upon a method to make the S's hold on to the correct attributes even when their parent A was changed.

We had been paralyzed. The minute we tweaked one bit of logic, we realized we'd fouled up another. But our music major moved freely. Instead of freezing up over the logical permutations behind each A and S, she found that these symbols put her in the mind of musical notes. As notes, they could be made to work in concert. They could be orchestrated.

On a subsequent project, our problem was pointers. In programming language, a pointer is an object that refers to some master value stored elsewhere. This might sound straightforward, but pointers are like ghosts in the system. A single misdirected one can crash a program. Our pointer wizard was a philosophy major who had no trouble at all with the idea of a named "thing" being a transient stand-in for some other unseen Thing. For a Plato man, this was mother's milk.

I've worked in software for years and, time and again, I've seen someone apply the arts to solve a problem of systems. The reason for this is simple. As a practice, software development is far more creative than algorithmic.

The developer stands before her source code editor in the same way the author confronts the blank page. There's an idea for what is to be created, and the (daunting) knowledge that there are a billion possible ways to go about it. To proceed, each relies on one part training to three parts creative intuition. They may also share a healthy impatience for the ways things "have always been done" and a generative desire to break conventions. When the module is finished or the pages complete, their quality is judged against many of the same standards: elegance, concision, cohesion; the discovery of symmetries where none were seen to exist. Yes, even beauty.

To be sure, each craft also requires a command of the language and its rules of syntax. But these are only starting points. To say that more good developers will be produced by swapping the arts for engineering is like saying that to produce great writers, we should double down on sentence diagraming.

Here the technologists may cry foul, say I'm misrepresenting the argument, that they're not calling to avoid the humanities altogether, but only to replace them in undergraduate study. "Let college be for science and engineering, with the humanities later." In tech speak, this is an argument for the humanities as plug-in.

But if anything can be treated as a plug-in, it's learning how to code. It took me 18 months to become proficient as a developer. This isn't to pretend software development is easy — those were long months, and I never touched the heights of my truly gifted peers. But in my experience, programming lends itself to concentrated self-study in a way that, say, "To the Lighthouse" or "Notes Toward a Supreme Fiction" do not. To learn how to write code, you need a few good books. To enter the mind of an artist, you need a human guide.

For folks like Mr. Khosla, such an approach is dangerous: “If subjects like history and literature are focused on too early, it is easy for someone not to learn to think for themselves and not to question assumptions, conclusions, and expert philosophies.” (Where some of these kill-the-humanities pieces are concerned, the strongest case for the liberal arts is made just in trying to read them.)

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How much better is the view of another Silicon Valley figure, who argued that “technology alone is not enough — it’s technology married with liberal arts, married with the humanities, that yields us the result that makes our heart sing.”

His name? Steve Jobs.

“Is majoring in liberal arts a mistake for students?”

by Vinod Khosla, *New York Times*, Feb. 10, 2016

Critical Thinking and the Scientific Process First — Humanities Later

If luck favors the prepared mind, as Louis Pasteur is credited with saying, we’re in danger of becoming a very unlucky nation. Little of the material taught in Liberal Arts programs today is relevant to the future.

Consider all the science and economics that has been updated, the shifting theories of psychology, the programming languages and political theories that have been developed, and even how many planets our solar system has. Much, like literature and history, should be evaluated against updated, relevant priorities in the 21st century.

I feel that liberal arts education in the United States is a minor evolution of 18th century European education. The world needs something more than that. Non-professional undergraduate education needs a new system that teaches students how to learn and judge using the scientific process on issues relating to science, society, and business.

Though Jane Austen and Shakespeare might be important, they are far less important than many other things that are more relevant to make an intelligent, continuously learning citizen, and a more adaptable human being in our increasingly more complex, diverse and dynamic world.

I would coin a new term, “the liberal sciences,” as this basic education, the test for which would be quite simple: at the end of an undergraduate education, is a student roughly able to understand and discuss the Economist, end-to-end, every week. This modern, non-professional education would meet the original “Greek life purpose” of a liberal arts education, updated for today’s world.

The most important things for a general, non-professional or vocational education are critical thinking and problem-solving skills, familiarity with logic and the scientific process, and the ability to use these in forming opinions, discourse, and in making decisions. Other general skills that are also important include — but are not limited to — interpersonal skills and communication skills .

So what is wrong with today’s typical liberal arts degree?

Neither the old definition of liberal arts nor the current implementation of it is the best use of four years of somebody’s education (if it is to be non-professional). The hardest (and most lucrative) problems to solve are non-technical problems. In my opinion, getting a STEM degree gives you the tools to think about those problems more effectively than a liberal arts degree today; though it is far from a complete way of thinking, and a liberal science degree will do this in an even more complete form.

Some of you will point to very successful people who’ve gone to Yale and done well, but you don’t understand statistics. A lot of successful people have started out as liberal arts majors. A

lot haven't. If you're very driven and intelligent or lucky, you'll probably be successful in life, even with today's liberal arts degree. Then again, if you're that driven and intelligent, you could probably find success with any degree, or even no degree. Apple's Steve Jobs and Joi Ito (Director of the MIT media lab) are both college dropouts. Joi is a largely self-taught computer scientist, disc jockey, nightclub entrepreneur and technology investor. The top 20% of people in any cohort will do well independent of what curriculum their education follows, or if they had any education at all. If we want to maximize the potential of the other 80%, then we need a new Liberal Sciences curriculum.

[Yale just decided that Computer Science was important](#) and I like to ask, "if you live in France, shouldn't you learn French? If you live in the computer world, shouldn't you learn Computer Science?" What should be the second required language in schools today if we live in a computer world? And if you live in a technology world what must you understand? Traditional education is far behind and the old world tenured professors at our universities with their parochial views and interests will keep dragging them back. My disagreement is not with the goals of a liberal arts education but its implementation and evolution (or lack thereof) from 18th century European education and its purpose. There is too little emphasis on teaching critical thinking skills in schools, even though that was the original goal of such education. Many adults have little understanding of important science and technology issues or, more importantly, how to approach them, which leaves them open to poor decision-making on matters that will affect both their families and society in general.

Connections matter and many Ivy League colleges are worth it just to be an alumnus. There are people with the view that liberal arts broadened their vision and gave them great conversational topics. There are those who argue that the humanities are there to teach us what to do with knowledge. As one observer commented: "They should get lawyers to think whether an unjust law is still law. An engineer could contemplate whether Artificial Intelligence is morally good. An architect could pause to think on the merit of building a house fit for purpose. A doctor could be taught whether and how to justify using scarce medical resources for the benefit of one patient and not another. This is the role of humanities — a supplement to STEM and the professions."

In my view creativity, humanism, and ethics are very hard to teach, whereas worldliness and many other skills supposedly taught through the liberal arts are more easily self-taught in a continuously updating fashion if one has a good quantitative, logical and scientific process-oriented base education.

The argument goes that a scientific/engineering education lacks enough training in critical thinking skills, creativity, inspiration, innovation and holistic thinking. On the contrary, I argue that the scientific and logical basis of a better liberal sciences education would allow some or all of this — and in a more consistent way. The argument that being logical makes one a linear problem solver and ill prepared for professions that require truly creative problem solving has no merit in my view. The old version of the Liberal Arts curriculum was reasonable in a world of the far less complex 18th century Euro-centric world and an elitist education focused on thinking and

leisure. Since the 20th century, despite its goals, it has evolved as the “easier curriculum” to get through college and may now be the single biggest reason students pursue it.

I do not believe that today’s typical liberal arts degree turns you into a more complete thinker; rather, I believe they limit the dimensionality of your thinking since you have less familiarity with mathematical models (to me it’s the dimensionality of thinking that I find deficient in many people without a rigorous education), and worse statistical understanding of anecdotes and data (which liberal arts was supposedly good at preparing students for but is actually highly deficient at). People in the humanities fields are told that they get taught analytical skills, including how to digest large volumes of information, but I find that by and large such education is poor at imparting these skills. Maybe, that was the intent but the reality is very far from this idealization (again, excluding the top 20%).

There is a failing in many college programs that are not pragmatic enough to align and relate liberal arts program to the life of a working adult. From finance to media to management and administration jobs, necessary skills like strategic-thinking, finding trends, and big-picture problem-solving have all evolved in my view to need the more quantitative preparation than today’s degrees provide.

Such skills, supposedly the purview of liberal arts education, are best learnt through more quantitative methods today. Many vocational programs from engineering to medicine also need these same skills and need to evolve and broaden to add to their training. But if I could only have one of a liberal arts or an engineering/science education, I’d pick the engineering even if I never intended to work as an engineer and did not know what career I wanted to pursue.

I have in fact almost never worked as an engineer but deal exclusively with risk, evolution of capability, innovation, people evaluation, creativity and vision formulation. That is not to say that goal setting, design, and creativity are not important or even critical. In fact these need to be added to most professional and vocational degrees, which are also deficient for today’s practical careers.

More and more fields are becoming very quantitative, and it’s becoming harder and harder to go from majoring in English or history to having optionality on various future careers and being an intelligent citizen in a democracy. Math, statistics and science are hard, and school is a great time to learn those areas, whereas many of the liberal arts courses can be pursued after college on the base of a broad education. But without training in the scientific process, logic and critical thinking, discourse and understanding are both made far more difficult.

A good illustrative example of the problems of today’s liberal arts education can be found in the writing of well-known author, Malcolm Gladwell, a history major and a one-time writer for The New Yorker. Gladwell famously argued that stories were more important than accuracy or validity without even realizing it. The New Republic called the final chapter of Gladwell’s *Outliers*, “impervious to all forms of critical thinking” and said that Gladwell believes “a perfect anecdote proves a fatuous rule.” Referencing a Gladwell reporting mistake in which Gladwell refers to

“eigenvalue” as “Igon Value,” Harvard professor and author Steven Pinker criticizes his lack of expertise: “I will call this the Igon Value Problem: when a writer’s education on a topic consists in interviewing an expert, he is apt to offer generalizations that are banal, obtuse or flat wrong.” Unfortunately too many in today’s media are similarly “uneducated” in their interpretation of experts. Storytelling and quotes become a misleading factor instead of being an aid to communicating the accurate facts more easily. His assertions around “10,000 hours” may or may not be true but his arguments for it carry very little weight with me because of the quality of his thinking.

Though one example of Malcolm Gladwell does not prove the invalidity of arguments for a Liberal Arts degree, I find this kind of erroneous thinking (anecdotally) true of many humanities and liberal arts graduates. In fact I see the inconsistencies that Gladwell failed to understand (giving him the benefit of the doubt that these were unintentional) in the writings of many authors of articles in supposedly elite publications like *The New Yorker* and *The Atlantic*. Again this is not a statistically valid conclusion but the impression across hundreds or thousands of examples of one person. When I do occasionally read articles from these publications, I make a sport of judging the quality of thinking of the writers as I read, based on false arguments, unsupported conclusions, confusion of story telling with factual assertions, mistaking quotes from interviews as facts, misinterpreting statistics, etc. Similar lack of cogent thinking leads to bad decisions, uninformed rhetoric, and lack of critical thinking around topics like nuclear power and GMOs.

Unfortunately in an increasingly complex world, all these topics skills that many liberal arts majors even at elite universities fail to muster. The topic of risk and risk assessment from simple personal financial planning to societal topics like income inequality is so poorly understood and considered by most liberal arts majors as to make me pessimistic. I am not arguing that engineering or STEM education is good at these topics but rather that this is not its intent of STEM or professional education. The intent of Liberal Arts education is what Steven Pinker called a “building a self” and I would add “for the technological and dynamically evolving 21st century”.

Learning new areas as career paths and interests evolve becomes harder. Traditional European liberal arts education was for the few and the elite. Is that still the goal today? People spend years and a small fortune or lifelong indebtedness to obtain it and employability should be a criterion in addition to an education’s contribution to intelligent citizenry.

Wikipedia defines “the liberal arts as those subjects or skills that in classical antiquity were considered essential for a free person to know in order to take an active part in civic life, something that (for Ancient Greece) included participating in public debate, defending oneself in court, serving on juries, and most importantly, military service. Grammar, logic, and rhetoric were the core liberal arts, while arithmetic, geometry, the theory of music, and astronomy also played a (somewhat lesser) part in education.” Today’s ideal list, not anchored in “classical antiquity” would be more expansive and more prioritized in my view.

Idealists and those who perceive liberal arts education today as meeting these goals are wrong not in its intent but in assessing how well it does this function (and that is an assertion/opinion). I agree that we need a more humanistic education but it is hard to agree or disagree with the current curriculum without defining what humanistic means. Does it really teach critical thinking, logic or the scientific process, things every citizen should know in order to participate in society? Does it allow for intelligent discourse or decision-making across a diverse set of beliefs, situations, preferences, and assumptions?

Should we teach our students what we already know, or prepare them to discover more? Memorizing the Gettysburg address is admirable but ultimately worthless; understanding history is interesting, even useful, but not as relevant as topics from the Economist. A student who can apply the scientific process or employ critical thinking skills to solve a big problem has the potential to change the world (or at minimum get a better-paying job). They can actually debate a topic like #blacklivesmatter, income inequality or Climate Change without being subject to “Trumpism” or emotion and biases-based distortions. No wonder half the college graduates who fill jobs as some studies indicate, actually fill jobs that don’t need a college degree! Their degree is not relevant to adding value to an employer (though that is not the only purpose of a degree).

Further, even if an ideal curriculum can be stitched together, most liberal arts majors infrequently do it. If the goal is not professional education then it must be general education, which requires many more must-have requirements for me to consider a university degree respectable. Of course others are entitled to their own opinion, though the right answer is testable if one agrees that the goals of such an education are intelligent citizenry and/or employability.

For now I am mostly leaving aside matters related to professional, vocational or technical curriculum. I’m also ignoring the not irrelevant and pragmatic issues of education affordability and the burden of student debt, which would argue for a more employment-enabling type of education. The failure I am referring to are two-fold: (1) the failure of curriculums to keep up with the changing needs of modern society and (2) liberal arts becoming the “easy curriculum” for those who shy away from the more demanding majors and prefer an easier, often (but not always) more socially-oriented college life. Ease, not value, or interest instead of value become key criteria in designing a curriculum for many students today. And for those of you who think this is not true, I am asserting based on my experience this is true for the majority of today’s students, but not for every liberal arts student.

Not every course is for every student but the criteria need to match the needs of the student and not their indulgences, taking interests and capability into account. “Pursue your passion” even if it increases the probability of getting you into unemployment or homelessness later is advice I have seldom agreed with (yes there are occasions this is warranted, especially for the top or the bottom 20% of students). More on passions later but I’m not saying passions are unimportant. What I am saying is with today’s implementation of a liberal arts curriculum, even at elite universities like Stanford and Yale, I find that many liberal arts majors (excluding roughly the top

20% of students) lack the ability to rigorously defend ideas, make compelling, persuasive arguments, or discourse logically.

Steven Pinker—in addition to refuting Gladwell—has a brilliant, clarion opinion on what education ought to be, [writing in The New Republic](#), “It seems to me that educated people should know something about the 13-billion-year prehistory of our species and the basic laws governing the physical and living world, including our bodies and brains. They should grasp the timeline of human history from the dawn of agriculture to the present. They should be exposed to the diversity of human cultures, and the major systems of belief and value with which they have made sense of their lives. They should know about the formative events in human history, including the blunders we can hope not to repeat. They should understand the principles behind democratic governance and the rule of law. They should know how to appreciate works of fiction and art as sources of aesthetic pleasure and as impetuses to reflect on the human condition.”

Though I agree, I am not sure this curriculum is more important than the ideas below. Based on the skills defined below any gaps in the above education can be filled in by students post graduation.

So what should non-professional elite education entail?

If we had enough time in school, I would suggest we do everything. Sadly that is not realistic, so we need a prioritized list of basic requirements because every subject we do cover excludes some other subject given the fixed time we have available. We must decide what is better taught during the limited teaching time we have, and what subjects are easier learnt during personal time or as post-education or graduate pursuits.

In the new Liberal Science curriculum I propose, students would master:

1. The fundamental tools of learning and analysis, primarily critical thinking, the scientific process or methodology, and approaches to problem solving and diversity.
2. Knowledge of a few generally applicable topics and knowledge of the basics such as logic, mathematics, and statistics to judge and model conceptually almost anything one might run into over the next few decades.
3. The skills to “dig deep” into their areas of interest in order to understand how these tools can be applied to one domain and to be equipped to change domains every so often
4. Preparation for jobs in a competitive and evolving global economy or preparation for uncertainty about one’s future direction, interest, or areas where opportunities will exist.
5. Preparation to continuously evolve and stay current as informed and intelligent citizens of a democracy

Critical subject matter should include economics, statistics, mathematics, logic and systems modeling, psychology, computer programming, and current (not historical) cultural evolution

(Why rap? Why ISIS? Why suicide bombers? Why the Kardashians and Trump? Why environmentalism and what matters and what does not? And of course the question, are the answers to these questions expert opinions or have some other validity?).

Furthermore, certain humanities disciplines such as literature and history should become optional subjects, in much the same way that physics is today (and, of course, I advocate mandatory basic physics study along with the other sciences). And one needs the ability to think through many, if not most, of the social issues we face (which the softer liberal arts subjects ill-prepare one for in my view).

Imagine a required course each semester where every student is asked to analyze and debate topics from every issue of a broad publication such as *The Economist* or *Technology Review*. And imagine a core curriculum that teaches the core skills to have the discussions above. Such a curriculum would not only provide a platform for understanding in a more relevant context how the physical, political, cultural and technical worlds function, but would also impart instincts for interpreting the world, and prepare students to become active participants in the economy.

It would be essential to understand psychology because human behavior and human interaction are important and will continue to be so. I'd like people who are immune to the fallacies and agendas of the media, politicians, advertisers, and marketers because these professions have learned to hack the human brain's biases (a good description of which are described in Dan Kahneman's [Thinking Fast & Slow](#) and in Dan Gardner's [The Science of Fear](#)). I'd like to teach people how to understand history but not to spend time getting the knowledge of history, which can be done after graduation.

I'd like people to read a New York Times article and understand what is an assumption, what's an assertion by the writer, what are facts, and what are opinions, and maybe even find the biases and contradictions inherent in many articles. We are far beyond the days of the media simply reporting news, shown by the different versions of the "news" that liberal and conservative newspapers in the US report, all as different "truths" of the same event. Learning to parse this media is critical. I'd like people to understand what is statistically valid and what is not. What is a bias or the color of the writer's point of view.

Students should learn the scientific method, and most importantly how to apply its mental model to the world. The scientific method requires that hypotheses be tested in controlled conditions; this can diminish the effects of randomness and, often, personal bias. This is very valuable in a world where too many students fall victim to confirmation biases (people observe what they expect to observe), appeal to new and surprising things, and narrative fallacies (once a narrative has been built, its individual elements are more accepted). There are many, many types of human biases defined in psychology that people fall victim to. Failure to understand mathematical models and statistics makes it substantially more difficult to understand critical questions in daily life, from social sciences to science and technology, political issues, health claims and much more.

I'd also suggest tackling several general and currently relevant topic areas such as genetics, computer science, systems modeling, econometrics, linguistics modeling, traditional and behavioral economics, and genomics/bioinformatics (not an exhaustive list) which are quickly becoming critical issues for everyday decisions from personal medical decisions to understanding minimum pay, economics of taxes and inequality, immigration, or climate change. E.O. Wilson argues in his book [“The Meaning of Human Existence”](#) that it is hard to understand social behavior without understanding multi-level selection theory and the mathematical optimization that nature performed through years of evolutionary iterations. I am not arguing that every educated person should be able to build such a model but rather that they should be able to “think” such a model qualitatively.

Not only do these topics expose students to a lot of useful and current information, theories, and algorithms, they may in fact become platforms to teach the scientific process — a process that applies to (and is desperately needed for) logical discourse as much as it applies to science. The scientific process critically needs to be applied to all the issues we discuss socially in order to have intelligent dialog. Even if the specific information becomes irrelevant within a decade (who knows where technology will head next; hugely important cultural phenomena and technologies like Facebook, Twitter, and the iPhone didn't exist before 2004, after all), it's incredibly useful to understand the current frontiers of science and technology as building blocks for the future.

It's not that history or Kafka are not important, but rather it is even more critical to understand if we change the assumptions, environmental conditions and rules that applied to historical events, that would alter the conclusions we draw from historical events today. Every time a student takes one subject they exclude the possibility of taking something else. I find it ironic that those who rely on “history repeating itself” often fail to understand the assumptions that might cause “this time” to be different. The experts we rely on for predictions have about the same accuracy as dart-throwing monkeys according to at least one very exhaustive study by Prof Phil Tetlock. So it is important to understand how to rely on “more likely to be right” experts, as defined in the book [Superforecasters](#). We make a lot of judgments in everyday life and we should be prepared to make them intelligently.

Students can use this broad knowledge base to build mental models that will aid them in both further studies and vocations. Charlie Munger, the famous investor from Berkshire Hathaway, speaks about mental models and what he calls “elementary, worldly wisdom.” Munger believes a person can combine models from a wide range of disciplines (economics, mathematics, physics, biology, history, and psychology, among others) into something that is more valuable than the sum of its parts. I have to agree that this cross-disciplinary thinking is becoming an essential skill in today's increasingly complex world.

“The models have to come from multiple disciplines because all the wisdom of the world is not to be found in one little academic department,” Munger explains. “That's why poetry professors, by and large, are so unwise in a worldly sense. They don't have enough models in their heads. So you've got to have models across a fair array of disciplines... These models generally fall into two

categories: (1) ones that help us simulate time (and predict the future) and better understand how the world works (e.g. understanding a useful idea from like autocatalysis), and (2) ones that help us better understand how our mental processes lead us astray (e.g., availability bias).” I would add that they provide the “common truth” in discussions where the well educated discussants disagree.

After grasping the fundamental tools of learning and some broad topical exposure, it’s valuable to “dig deep” in one or two topic areas of interest. For this, I prefer some subject in science or engineering rather than literature or history (bear with me before you have an emotional reaction; I’ll explain in a minute). Obviously, it’s best if students are passionate about a specific topic, but it’s not critical as the passion may develop as they dig in (some students will have passions, but many won’t have any at all). The real value for digging deep is to learn how to dig in; it serves a person for the duration of their life: in school, work, and leisure. As Thomas Huxley said, “learn something about everything and everything about something,” though his saying that does not make it true. Too often, students don’t learn that a quote is not a fact.

If students choose options from traditional liberal-education subjects, they should be taught in the context of the critical tools mentioned above. If students want jobs, they should be taught skills where future jobs will exist. If we want them as intelligent citizens, we need to have them understand critical thinking, statistics, economics, how to interpret technology and science developments, and how global game theory applies to local interests. Traditional majors like international relations and political science are passé as base skills and can easily be acquired once a student has the basic tools of understanding. And they and many other traditional liberal arts subjects like history or art will be well served in graduate level work. I want to repeat that this is not to claim those “other subjects” are not valuable. I think they are very appropriate for graduate level study.

Back to history and literature for a moment — these are great to wrestle with once a student has learned to think critically. My contention is not that these subjects are unimportant, but rather that they are not basic or broad enough “tools for developing learning skills” as they were in the 1800s, because the set of skills needed today has changed. Furthermore, they are topics easily learned by someone trained in the basic disciplines of thinking and learning that I’ve defined above. This isn’t as easy the other way around. A scientist can more easily become a philosopher or writer than a writer or philosopher can become a scientist.

If subjects like history and literature are focused on too early, it is easy for someone not to learn to think for themselves and not to question assumptions, conclusions, and expert philosophies. This can do a lot of damage.

Separating the aspirational claims by universities from the reality of today’s typical liberal arts education I tend to agree with the views of William Deresiewicz. He was an English professor at Yale from 1998–2008 and recently published the book [“Excellent Sheep: The Miseducation of the American Elite and the Way to a Meaningful Life.”](#) Deresiewicz [writes on the current state of](#)

[liberal arts](#), “At least the classes at elite schools are academically rigorous, demanding on their own terms, no? Not necessarily. In the sciences, usually; in other disciplines, not so much. There are exceptions, of course, but professors and students have largely entered into what one observer called a ‘nonaggression pact.’” Easy is often the reason students pick liberal arts subjects today.

Lots of things are important but what are the most important goals of an education?

To repeat, school is a place where every student should have the opportunity to become a potential participant in whatever they might want to tackle in the future, with an appropriate focus not only on what they want to pursue but also, pragmatically, what they will need to do to be productively employed or productive and thinking member of society. By embracing thinking and learning skills, and adding a dash of irreverence and confidence that comes from being able to tackle new arenas (creative writing as a vocational skill, not a liberal arts education, may have a role here, but Macbeth does not make my priority list; we can agree to disagree but if we discourse I want to understand the assumptions that cause us to disagree, something many students are unable to do), hopefully they will be lucky enough to help shape the next few decades or at least be intelligent voters in a democracy and productive participants in their jobs .

With the right critical lens, history, philosophy, and literature can help creativity and breadth by opening the mind to new perspectives and ideas. Still, learning about them is secondary to learning the tools of learning except possibly the right approach to philosophy education. Again I want to remind you that none of this applies to the top 20% of students who learn all these skills independent of their education or major. Passions like music or literature (leaving aside the top few students who clearly excel at music or literature) and its history may be best left to self-pursuit, while exploring the structure and theory of music or literature may be a way to teach the right kind of thinking about music and literature!

For some small subset of the student body, pursuing passions and developing skills in subjects such as music or sports can be valuable, and I am a fan of schools like Juilliard, but in my view this must be in addition to a required general education especially for the “other 80%”. It’s the lack of balance in general education which I am suggesting needs to be addressed (including for engineering, science and technology subjects’ students. Setting music and sports aside, with the critical thinking tools and exposure to the up-and-coming areas mentioned above, students should be positioned to discover their first passion and begin to understand themselves, or at the least be able to keep up with the changes to come, get (and maintain) productive jobs, and be intelligent citizens.

At the very least they should be able to evaluate how much confidence to place in a New York Times study of 11 patients on a new cancer treatment from Mexico or a health supplement from China and to assess the study’s statistical validity and whether the treatment’s economics make sense. And they should understand the relationship between taxes, spending, balanced budgets, and growth better than they understand 15th century English history in preparation for “civic

life” to quote the original purpose of a liberal arts education. And if they are to study language or music, Dan Levitin’s book “This Is Your Brain on Music: The Science of a Human Obsession” should be first reading or its equivalent in linguistics. It can teach you about a human obsession but also teach you how to build a mathematical model in your head and why and how Indian music is different than Latin music. In fact, these should be required for all education, not just liberal arts education, along with the other books mentioned above.

The role of passion and emotion in life is best epitomized by a quote (unknown source) I once saw that says the most important things in life are best decided by the heart and not logic. For the rest we need logic and consistency. The “what” may be emotion and passion based but the “how” often (yes, sometimes the journey is the reward) needs a different approach that intelligent citizens should possess and education should teach.

I am sure I have missed some points of view, so I look forward to starting a valuable dialogue on this important topic.