

Applied Education Foundation Introduction

*The meaning of “knowing” has shifted from being able to remember and repeat information to being able to find and use it.*¹ Herbert Simon

I have never let my schooling interfere with my education. Mark Twain

Education Is Not the Learning of Facts, But the Training of the Mind to Think. Believed attributable to Albert Einstein²

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Applied Education Foundation
Promoting Education in the Useful Arts & Sciences

¹ *How People Learn: Brain, Mind, Experience, and School*, National Academy of Sciences, National Research Council, National Academy Press, 2000.

² See <https://quoteinvestigator.com/2016/05/28/not-facts/>

³ In this and all my other essays, I will periodically add applicable supplemental information as new information becomes available. Therefore, this published year refers to its first release to the public.

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Introduction

There are many talents/abilities/intelligences that humans possess,⁴ and none are superior to any other because the loss of any one of them would come at a high cost to human welfare and happiness. We need to recognize differences between every individual – something many may believe is true, but ignore nonetheless when it comes to elementary and secondary education, where a one-size-fits-all approach dominates, and the vast majority of Americans are marginalized in economic terms.

The drive to be superior to others is, perhaps, instinctual in humans, and therefore individuals tend to associate with people who provide them with an elevated sense of importance. Once such associations are formed, those who compose them attempt to assert their superiority and supremacy over others. For example: Those with abstract talents coupled with memory and recall abilities have historically optimized educational systems for these particular and narrowly focused talents, thereafter asserting that such abilities make them superior, i.e., more intelligent than everyone else. This provides them with a sense of entitlement to structure social institutions in ways that serve their talents.⁵ Such institutions are hijacked and managed in ways that alienate or marginalize all others.

This is what has happened to our educational establishment, and it is the purpose of my essays to reveal these malicious human tendencies and to offer alternatives that enfranchise all through diverse educational offerings, rather than the narrowly tailored ones we now labor under. This is extremely important to comprehend since credentials can be essential to success – though not always – but are accessible primarily through the highly optimized and well-guarded academic establishment; hence the term “hijacked” is *apropos*.

What I Am Proposing

In the final analysis, I wish to offer alternative pathways for the large and silent majority who are not limited by predominately abstract boundaries (e.g., those who believe in learning for its own sake) but who are primarily practical in nature. Such alternatives will be based on applied curricula, which differ from both the current college prep program and the vocational or career technical education (CTE) programs. College prep is too abstract in most cases, with little to no tie with real world applications or needs, while CTE is typically too focused on narrow applications, with little to no solid theories backing instruction (of course, this varies from one school district to another). An applied education program would combine application with axioms so that they are mutually reinforcing. Cognitive psychologists⁶ have found this to be the most effective way for students to grasp instruction.

⁴ See Gardner, Howard, *Frames of Mind: The Theory of Multiple Intelligences*, Basic Books, 1983.

⁵ See Quigley, Carroll, *The Evolution of Civilizations: An Introduction to Historical Analysis*, Liberty Fund, 1979.

⁶ Haskell (2001) defines cognitive psychology as “a subfield of psychology concerned with investigating how we think, reason, and process information.” (p. xiv)

My target audiences are citizens concerned about their children's future, and business leaders who are finding it increasingly difficult to recruit well-prepared individuals who can contribute significantly to their companies and can therefore be compensated in a reciprocal manner.

This essay is the first in a series of essays that will cover many of the problems with the education system; that is, why it is failing such a large majority of American citizens and what can be done to correct it. With such an analysis, it is my hope to expose the flaws in the system and to propose alternative educational offerings that will fit the needs of individuals, rather than serve a highly centralized, bureaucratic, statist system⁷ and its constituents.

I will infuse some of my essays with Herbert Spencer's (1860) well thought-out positions on education so that his ideas may be resurrected. To our detriment, they have been dormant for well over a century. During this slumber, a large body of literature has accumulated that demonstrates Spencer's wisdom on the subject. Though they are, perhaps, not perfect (especially his infatuation with science), his insights from another era help shed light on human flaws that are not necessarily period-dependent. That is, many of them are timeless, and until we recognize these flaws in our nature so that we may work on avoiding their negative consequences, history will simply repeat itself. Though the manifestations of these flaws may be adorned in different garb, there are close similarities between them.

My Approach

Since I quote others' works extensively, I would like to open this introduction with something Robert Haskell (2001) said: "Quotations bring a contextual meaning and flavor to findings that are frequently lost in paraphrasing. In addition, quotations emphasize that the material isn't just the opinion of a single author but is solidly based on the works of many other researchers."

With this understanding, I hope the reader recognizes that I am not trying to take credit for the work of others throughout my various essays, nor am I attempting to be "original" with my ideas, as academics typically aspire to be since this is important in their culture. However, I am not an academic, nor do I desire to be one. I am a citizen and businessman who is very concerned about the future of our society, and academia, as a whole, is at a loss as to what needs to be done – *can't see the forest for the trees* syndrome is applicable here. Therefore, I confront this dilemma from outside academia since significant change cannot take place within a blockaded system. It is simply counterproductive for insiders to dismantle the system that serves them so well.

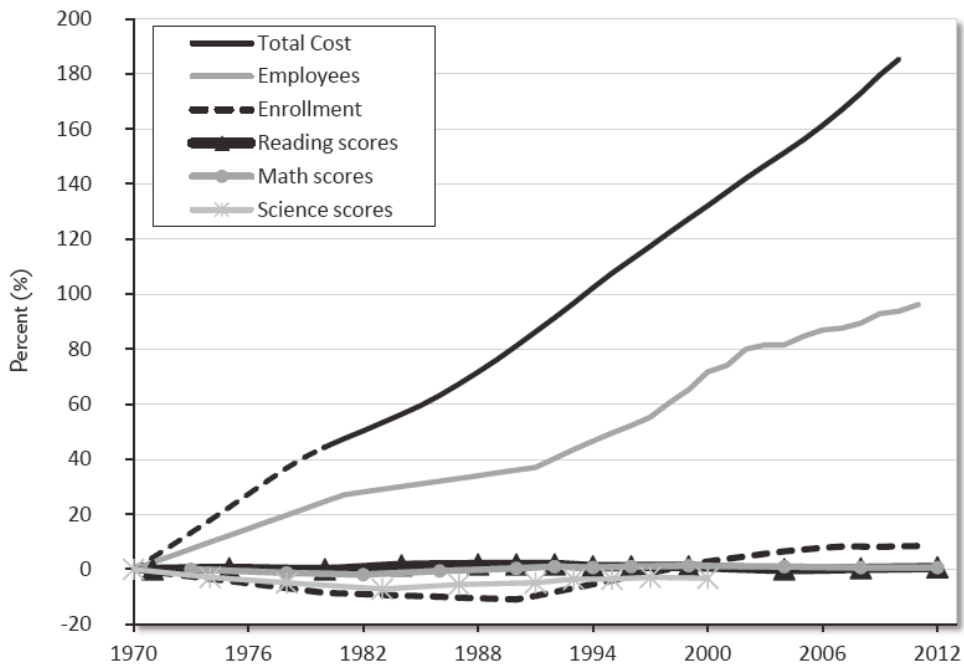
⁷ Our bureaucratic education system was imported from Germany in the late 19th century, when many American students studied in German universities and brought back the "new scientific educational methods" that, when coupled with an authoritarian government, would supposedly remedy all social ills, thereby bringing "utopia" to the world. This statist German movement came to be known as Progressivism in America and is still with us today in one form or another.

In addition, academics have been raised in an environment that tends to be hostile toward anything outside their comfort zone. They have traditionally fallen back on the old and tired adage that education is to develop “a well-rounded person,” which has very different meanings to many different people. This creates a safe harbor since it is a moving target that a definition can never be agreed upon by society. Keeping it in this metaphysical and relativistic realm provides indefinite cover.

Pew Research Center (2016) published a survey showing the differences of opinions amongst Americans regarding the purpose of education: “[T]here is no consensus regarding the main purpose of college. Roughly a third of adults (35%) say it should be to help individuals grow personally and intellectually, while 50% say it should be to teach job-related skills.” Therefore freedom of choice must be given due respect since self-determination – rather than government authoritarianism – is the underlying structure of our society.

Therefore it is my goal to remove the metaphysics from education and to lay bare the current educational institution’s condition and the effect it has on society so that individual freedom, and the subsequent superior results it provides, may once again come to dominate.

Trends in American Public Schooling Since 1970



Sources: U.S. Department of Education, “Digest of Education Statistics”; and NAEP tests, “Long Term Trends, 17-Year-Olds.”

Note: “Total cost” is the full amount spent on the K-12 education of a student graduating in the given year, adjusted for inflation. In 1970, the amount was \$56,903; in 2010, the amount was \$164,426.

A Comparison Between Career Technical Education (CTE) and a College Prep Program Sheds Light on the Dilemma

Dougherty (2016) separates the disconnected abstract college prep program from the real-world CTE program:

Ask any group of high school teachers, and they will report that the most frequently heard question in their classrooms is, “When are we ever gonna use this?” In a traditional college prep program, the honest answer is usually, “Maybe when you get to the university.” But in the real world? ... [M]aybe not at all.

However, in high-quality Career and Technical Education programs, that question is moot. Students learn skills that will help them prepare for stable careers and success in a modern, global, and competitive economy.

... Unfortunately for millions of American students, CTE is not a meaningful part of their high school experience. Instead, they are shuffled through large, bureaucratized schools that do not adequately prepare them for anything, be it college, career, or both.

In large part, this is because CTE has been chronically neglected by American education leaders and policymakers. Many CTE advocates suspect that it’s because of the damaged “brand” of vocational education. And it’s damaged for a reason, as there was a time when the “vo-tech” track was a pathway to nowhere. “Tracking,” as practiced in the twentieth century, was pernicious. It sent a lot of kids – especially low-income and minority students – into low-paying, menial jobs, or worse.

Yet America is an anomaly. In most industrialized countries – nearly all of which outperform us on measures of academic achievement, such as PISA and TIMSS – students begin preparing for a career while still in high school. Around the world, CTE is not a track away from a successful adulthood, but rather a path towards it.

American students face a double-whammy: Not only do they lack access to high-quality secondary CTE, but then they are subject to a “bachelor’s degree or bust” mentality. And many do bust, dropping out of college with no degree, no work skills, no work experience, and a fair amount of debt. That’s a terrible way to begin adult life. We owe it to America’s students to prepare them for whatever comes after high school, not just academic programs at four-year universities (p. 1).

... Why don’t we see more communities embracing high-quality CTE? Why are students nationwide taking fewer CTE courses today instead of more? Would it help if policymakers, educators, parents, and kids could see that CTE today isn’t a dead-end track?

That's where this study comes in. We wanted to know whether the students who participated in CTE – and especially those “concentrating” by taking a sequence of three or more courses aligned to a career in a specific industry – were achieving better outcomes than their peers. Were they more likely to graduate from high school? Enroll in postsecondary education? And, perhaps most importantly, be employed and earn higher wages (p. 2)?

As the results presented here show, high school CTE improves outcomes for students seeking to start their careers quickly, but is no hindrance to those who want additional academic training. ... In light of the central findings therefore, the strongest and most general recommendation is this: **Make high-quality, labor-market-aligned CTE available to all students, and encourage (and enable) them to participate** (p. 30; emphasis provided).

As Time Progresses, Technology, Knowledge, and Skills Evolve

Crotty (2015) states, “Jobs are ephemeral. However, skills are perennial. They grow, evolve, get redefined and reapplied, as the nature of work evolves in turn. We make the mistake in this country that we need to train people for jobs, when, instead, **we need to give them skills that they can apply to a range of jobs, including those currently in existence and those still to come**” (emphasis added). This is an extremely important point! **We rarely consider flexibility in education for economic pursuits. We think far too much about a general education that is loaded with superfluous information, to the exclusion of a broad understanding of how all things interconnect. With this lack of understanding of the world, it is difficult for individuals to transition from one type of job to another** within the same economic sector, such as construction trades where a person may need to switch from plumbing to carpentry for example.

Miller and Bui (2017) address this issue in their article *Switching Careers Doesn't Have to Be Hard: Charting Jobs That Are Similar to Yours*:

A New York Times review of the activities and skills that jobs entail, based on the Labor Department's [O*Net database](#), shows how much overlap there is between many seemingly dissimilar occupations. Service industry jobs, for example, require social skills and experience working with customers — which also apply to sales and office jobs.

A nice graph is then provided that summarizes the purpose of their article. It's titled, *Where Do American Jobs Fall on the Skill Spectrum?: A look at detailed skills data from the Labor Department shows how similar and dissimilar jobs are in the American labor market*. Go to https://www.nytimes.com/2017/07/27/upshot/switching-careers-is-hard-it-doesnt-have-to-be.html?_r=0 to view the graph.

Carter (2016) states, “Coursera President ... says that the college diploma of 15 years ago doesn't provide the necessary skills for a job in the 21st century.” This is nothing new. As time marches on, technology and cultural nuances change. This demonstrates

that the demand for particular skills will change over time, but they must be a necessary ingredient in an educational program for individuals to offer abilities to contemporaneous employers.

As times change, demands for skills change. This requires individuals to adapt to such changes. This means that individuals require an education that provides a panoramic perspective of an economy in general but which eventually leads to a particular economic sector that they choose to pursue for career aspirations. Education must not be designed so narrowly as to inhibit transfer from one industry to another. However, it must not be so broad and vague, as we currently have it, as to be useless, in large part, to individuals and society, unless those individuals pursue a career in education.

For example, if an individual chooses to pursue a professional career in construction, he needs an understanding of the role construction plays in the larger economy, but also the breadth of this economic sector in particular. While technology changes in regards to construction methods, raw materials, and innovations that make a home function based on contemporaneous consumer demands, a home is still a home. That is, it is still a shelter for human safety and comfort. Many other things may change, but this fundamental need is timeless. So while it is important to develop the skills of current conditions, many foundational economic and technological principles do not change. These are the principles that the skills must be overlaid on during the education period of youth.

This dichotomy of *changes* and *constants* has been a challenge for the collective mind of academia, which is dominated by a relativistic perspective. It is believed there are no truths other than “truths” individuals create for themselves. Therefore, this concept of providing curricula based on timeless truths is at odds with the foundational belief systems of the majority in the academic community, and it demonstrates the reason they cannot be entrusted with designing curricula.

The problem with many academics is their inability to see the *constants*, which can be observed in math, for example, and the *changes*, which physicists, for example, seek to identify, and which are based on the *constants*. This dichotomy is unresolvable in the minds of many academics, especially those in the social sciences and liberal arts.

The Lessons We Can Learn from Other Countries

Hsu (2016) reflects on the foolishness of the “college for all” mentality.

South Korea leads the world in college attendance rate, which is approaching 100%. This sounds great at first, until you consider that the majority of the population (in any country) lacks the cognitive ability to pursue a rigorous college education (or at least what used to be defined as a rigorous college education).

Chronicle of Higher Education:... Seongho Lee, a professor of education at Chung-Ang University, criticizes what he calls “college education inflation.” Not

all students are suited for college, he says, and across institutions, their experience can be inconsistent. “It’s not higher education anymore,” he says. “It’s just an extension of high school.” And subpar institutions leave graduates ill prepared for the job market. [*The exact same thing happened in 19th century America as it relates to high school.*]

A 2013 study by McKinsey Global Institute, the economic-research arm of the international consulting firm, found that lifetime earnings for graduates of Korean private colleges were less than for workers with just a high-school diploma. In recent years, the unemployment rate for new graduates has topped 30 percent.

“The oversupply in college education is a very serious social problem,” says Mr. Lee, even though Korea, with one of the world’s lowest fertility rates, has a declining college-age population. The country, he worries, is at risk of creating an “army of the unemployed.”

There is a correlation between a country’s levels of education and fertility rates. As the levels of education rise, fertility tends to fall.

Contrary to what most people might think, there are social costs for high graduation rates: A majority of people will be overqualified and therefore will end up being underemployed. Pellissier (2016) provides insight into this by analyzing Korea.

Today South Korea is often regarded, along with Finland, as one of the two premier K-12 education systems in the world – in no small part due to the spectacular academic performance of its students. ... More than 97% of South Koreans graduate from high school, the highest graduation rate in the world.

What never seems to be asked is, what do people get with an academic oriented diploma? It is simply assumed, without any questions attached, that it is necessary. Necessary for what? To fit neatly into statistical averages that imply if you don’t get this arbitrary academic certificate you will be a “loser”? It is never taken into consideration that a lot of people who receive their high school and college diplomas are still economic and/or social “losers.” It comes down to a choice of the lesser of evils: Get the degree and you stand a better chance, though not necessarily a good chance, of success; forgo a degree and you are damned. What kind of product/service offering is this? Try this in the private sector and see how successful you’ll be! Only monopolies and bureaucracies can get away with this kind of logic, or should I say, illogic.

Pellissier continues:

Should the United States emulate South Korea by ... adopting its ... educational practices? If higher test scores and graduation rates are the goal, the logical answer would be yes. After all, the United States’ position in the PISA⁸ surveys is

⁸ Programme for International Student Assessment

always far below average, seldom cracking the top 20 list. Yet a deeper look at the South Korean model suggests that its success comes at a price.

South Koreans attend school 220 days per year, almost two months more than the 180 days of Americans. ... What distinguishes South Koreans from everyone else, however, is the immense number of hours they study outside the classroom. High schoolers, and even middle schoolers, in South Korea are often engaged in scholastics until midnight or 2 a.m. After taking classes in up to 11 subjects, they attend private academies ... where they obtain supplemental learning. The bottom line? Most South Korean children spend 13 hours a day or more with their bottoms glued to a chair.

Although these grueling schedules help South Korea's high test scores, the nation is remarkably inefficient at another PISA criterion known as "study effectiveness." When PISA calculates each nation's achievement based on the number of hours spent studying, South Koreans rank only 24th out of 30 developed nations. The winner in study effectiveness is Finland, the world's true PISA champ, placing first in science, second in math, and second in reading. Finnish students only attend school 190 days per year (two weeks more than U.S. children) and receive less than a half-hour of homework per day.

In the face of high expectations and high-stakes grading, South Korean teens don't enjoy what many would consider a healthy balance of school, play, and sleep. So-called enrichments ... are at a low premium.... Supporting student social life is also a low priority compared to the U.S. schools.

... South Korean high school seniors often sleep only four hours per night for several months leading up to the college entrance exams, thereby adhering to the popular maxim "Sleep five hours and fail, sleep four hours and pass."

It can safely be assumed that academic types make the exam as difficult as they can get away with in order to make academia available to only those who fit the optimized talents that have arbitrarily evolved in their community. It is human nature to erect barriers around one's interests in order to elevate oneself above others and to protect one's economic and social standing. Academics have cornered the market on this human tendency. Capitalists cannot hold a candle to academics when it comes to selfishness and greed, but their greed simply takes a different form than capitalists.

Pellissier then provides:

... Relentless pressure and long hours, followed by tests that are regarded as the marker of all future success, produce unintended, and sometimes tragic, results. ... [R]ote learning in Korean schools does not prepare students for the creative, active, and self-motivated form of learning U.S. universities require.⁹

⁹ But then U.S. universities do not prepare students for the creative, active, and self-motivated form of learning U.S. companies require.

The system takes a profound emotional toll as well. South Korea's student suicide rate is among the world's highest....

Obviously, quantity of education is not the answer, as Korea demonstrates. Let's look at Finland to see how the ancient maxim of *quality over quantity* provides excellent evidence of this truth. To start, let's consider a summary of Finland's situation as reported by Ruzzi (2005).

When Finland gained independence in 1917, Finland was one of the least advanced economies in Europe. Today, it is one of Europe's richest and most successful nations. In fact, according to the World Economic Forum, Finland has the world's most competitive economy. One of the secrets of Finland's success is a high level of public investment in education and training. Finland's education system is one of the best in the world and generates people with the right skills to succeed in a modern ... economy. In a study analyzing the education of children in OECD nations, Finnish children had the highest overall scores.

... Children begin compulsory education at age seven, one year later than most industrialized countries. School is compulsory until age 16 or after nine years of schooling. At this point students attend either general upper secondary school or vocational upper secondary school. General upper secondary school lasts for three years and leads to college, typically a five-year program of study ending in a Masters Degree. Vocational school is also a three-year program leading to the polytechnic, typically a three-year course of study ending in a BA. It is possible for vocational students to go to college after some extra study.

... All students in basic education and general upper secondary school receive counseling in how to study, career planning and how to choose their next phase of education. Students with learning problems must receive remedial education....

Students who choose vocational upper secondary school attend a three year program that includes a minimum of six months of on-the-job-training. Forty-five percent of Finnish students work toward a vocational qualification.

In the early 1990s ... the Finnish Government began a reform of its vocation education system including basic vocational education and post-secondary vocational education and training. The reform had two major goals: to increase the number of Finns attending higher education by offering a shorter and cheaper alternative pathway to higher education and to upgrade and consolidate vocational education institutions at both the basic and post-secondary levels. ... By 2004, two-thirds of those entering higher education are in the polytechnic. Between 1993 and 1998, the number of students in polytechnics tripled, and the total in universities nearly doubled in the same five-year period. ...

A recent OECD review has noted: “The polytechnic policy in Finland has been remarkably successful. There is general acceptance of the existence and value of a sector of higher education with a distinctive educational mission.... In general, the programs are relevant to working life, innovative, and well received by employers and students.... There is a substantial consensus in Finland for provision of higher education different from that traditionally provided by universities, and directed towards the needs of working life.”

... The majority of eligible school leavers in Finland now elect to go to a polytechnic rather than a university. This, together with higher completion rates than universities and high post-graduation employment, indicates strong acceptance of the reforms among both young people and employers.

... Finland has one of the highest levels of educational attainment.... Evaluations and international comparisons show the Finnish higher education system to be comprehensive, relatively well-resourced, cost-effective in terms of expenditures per student, and a leader in terms of the quality, innovativeness and learning outcomes of studies.

Ruzzi reports a negative trend in Finland.

In OECD comparisons, Finland has evidenced low rates of return to higher education generally due to the long duration of university studies. Since it is not compulsory to obtain an undergraduate Bachelor’s degree, most university students are accepted directly into Master’s degree programmes.

This is an example where Finland has deviated from the principle of *quality over quantity*. Universities are infamous for their efforts to extend education for as long as they can in order to garner as much of the public’s resources as possible; all in the name of “making a well-rounded individual.” This, of course, has a different meaning to every individual who parrots this tired and worn-out cliché.

Ruzzi points to a shortcoming Finland needs to overcome:

The dual system of education may be leading to a general over-skilling of the Finnish population as well as mismatches between educational output and the needs of the labour market. Although the international trend is to eliminate formal differences between higher education degree programmes, there remains in Finland a separation between the programmes and degrees of universities and polytechnic institutes, with little student mobility between the two. For example, it is rare that a polytechnic graduate would attend a university for a higher degree or that university students would attain more practical skills through study at the polytechnic institutes. From the viewpoint of industry, this system may be producing an oversupply of people with university education and insufficient number of workers with the right combination of technical and professional skills (e.g. engineering and business).

This is probably due to academia making every effort to distance itself from real world interests. Academics tend to perform poorly in the real world and find academia a safe haven from demands that expect real and measurable results – hence the real reason for tenure. There is typically a significant gulf between polytechnic and academic interests due primarily to snobbery. It is understood that academic pursuits bestow “prestige,” whereas applied studies “merely” provide monetary rewards, which is perceived as for the vulgar masses. Though it is interesting to note that while academics covet their “status,” they despise the income that practical credentials provide. Despite this envy, the motivation typically doesn’t exist for academics to participate in building a bridge between abstract and practical studies, since it is in a realm that scares them. This demonstrates their inability to make good decisions as it relates to setting the proper course for education and for designing curricula.

Hancock (2011) provides further insight into Finnish education:

Finland has vastly improved in reading, math and science literacy over the past decade in large part because its teachers are trusted to do whatever it takes to turn young lives around.

... “Whatever it takes” is an attitude that drives not just Kirkkojarvi’s 30 teachers, but most of Finland’s 62,000 educators in 3,500 schools from Lapland to Turku – professionals selected from the top 10 percent of the nation’s graduates to earn a required master’s degree in education. Many schools are small enough so that teachers know every student. **If one method fails, teachers consult with colleagues to try something else.** They seem to relish the challenges. Nearly 30 percent of Finland’s children receive some kind of special help during their first nine years of school.

... **There are no mandated standardized tests in Finland, apart from one exam at the end of students’ senior year in high school. There are no rankings, no comparisons or competition between students, schools or regions.**

... **The differences between weakest and strongest students are the smallest in the world,** according to the most recent survey by the Organization for Economic Co-operation and Development (OECD). “Equality is the most important word in Finnish education. All political parties on the right and left agree on this,” said Olli Luukkainen, president of Finland’s powerful teachers union.

Ninety-three percent of Finns graduate from academic or vocational high schools,¹⁰ 17.5 percentage points higher than the United States, and 66 percent go

¹⁰ One can imagine this is due to the system offering a useful education, in contrast to Korea, where usefulness is not considered and status is the driving motivator.

on to higher education, the highest rate in the European Union. Yet **Finland spends about 30 percent less per student than the United States.**

... **“We prepare children to learn how to learn, not how to take a test,”** said Pasi Sahlberg, a former math and physics teacher who is now in Finland’s Ministry of Education and Culture. “We are not much interested in PISA. It’s not what we are about...”

Teachers in Finland spend fewer hours at school each day and spend less time in classrooms than American teachers. Teachers use the extra time to build curriculums and assess their students. **Children spend far more time playing outside,** even in the depths of winter. **Homework is minimal. Compulsory schooling does not begin until age 7.** “We have no hurry,” said Louhivuori. **“Children learn better when they are ready. Why stress them out?”**

... Not until sixth grade will kids have the option to sit for a district-wide exam, and then only if the classroom teacher agrees to participate. Most do, out of curiosity. Results are not publicized. **Finnish educators have a hard time understanding the United States’ fascination with standardized tests.** “Americans like all these bars and graphs and colored charts,” Louhivuori teased, as he rummaged through his closet looking for past years’ results. “Looks like we did better than average two years ago,” he said after he found the reports. “It’s nonsense. **We know much more about the children than these tests can tell us** (emphasis added).”

... Some of the more vocal conservative reformers in America have grown weary of the “We-Love-Finland crowd” or so-called Finnish Envy. They argue that the United States has little to learn from a country of only 5.4 million people – 4 percent of them foreign born. Yet the Finns seem to be onto something. Neighboring Norway, a country of similar size, embraces education policies similar to those in the United States. It employs standardized exams and teachers without master’s degrees. And like America, Norway’s PISA scores have been stalled in the middle ranges for the better part of a decade.

... By the mid-1980s, a final set of initiatives shook the classrooms free from the last vestiges of top-down regulation. Control over policies shifted to town councils. The national curriculum was distilled into broad guidelines. National math goals for grades one through nine, for example, were reduced to a neat ten pages. Sifting and sorting children into so-called ability groupings was eliminated. All children – clever or less so – were to be taught in the same classrooms, with lots of special teacher help available to make sure no child really would be left behind. The inspectorate closed its doors in the early ’90s, turning accountability and inspection over to teachers and principals. “We have our own motivation to succeed because we love the work,” said Louhivuori. “Our incentives come from inside.”

An interesting point Hancock reveals is that **43% of Finnish high school students attend vocational high schools**. “We help situate them in the right high school,” said then deputy principal Anne Roselius. “We are interested in what will become of them in life.” In contrast, U.S. school districts are motivated by how many students pursue college prep and then how many apply to a university upon graduation, ignoring any other groupings. For example, I’ve never heard of statistics emanating from a high school reporting how many of their students went on to trade schools or the like after graduation. Such silence is deafening and it reveals a cultural bias and why all effort is funneled into college prep. This helps explain one of the many reasons why Finnish education is **far superior** to ours.

In a report on Hancock’s article, Columbia University Graduate School of Journalism (2011) quoted her as saying: “**We talk about performing on tests, Finns talk about learning for the whole child. We talk about schools competing with each other. Finns talk about schools collaborating with each other** (emphasis added).” This sets the example of how U.S. public education must be forced to adopt student-friendly instruction for all. Educators will not change unless dictated to do so by the people. After all, they are our servants.

Stowe (2016) considers the contributions Educational Sloyd¹¹ has on Finland’s successes. He references the work of Patrik Scheinen, Dean of the University of Helsinki Graduate School of Social Sciences, who analyzed “links between educational Sloyd, craft training and the success of Finland’s schools, but from the standpoint of social sciences, proving a direct causative link would [be] difficult, or even impossible. Sloyd is part of the compulsory curriculum in all Finnish Schools, so it would be difficult to measure its value since there are no schools without Sloyd to provide a comparison.”

Sloyd provides a setting for applying academic concepts to real world scenarios. Cognitive psychologists are well aware that real world application offers deeper learning of abstract principles. If taught in tandem with abstract subjects, such as science and math, Sloyd could very well have a profound effect on Finland’s success story. This certainly seems to be the opinion of Scheinen.

Switzerland provides another example of educational methods the U.S. can learn much from. Luxner (2015) offers insight of the Swiss success story.

Switzerland employs a vocational training system that prepares young students for specific professions. **The Alpine nation is home to one of the lowest unemployment rates on the continent yet produces far fewer higher education graduates than many of its European counterparts** (emphasis added).

¹¹ **Sloyd** (*Slöjd*), also known as **Educational sloyd**, is a system of handicraft-based education started by **Uno Cygnaeus** in Finland in 1865. The system was further refined and promoted worldwide, and was taught in the United States until the early 20th Century. It is still taught as a compulsory subject in [Finnish], Swedish and Norwegian schools. <https://en.wikipedia.org/wiki/Sloyd>

Switzerland has the lowest youth unemployment rate in Europe (3.2 percent), one of the lowest crime rates of any industrialized country and the world's second-highest life expectancy after Japan.

In addition, its 8 million people enjoy one of the world's highest nominal per-capita GDPs, alongside Luxembourg, Qatar and Norway. The Swiss cities of Zürich, Geneva and Bern consistently rank among the most livable on Earth, and in 2015 – as it has for the past six years – the World Economic Forum ranked Switzerland first out of 144 countries in its Global Competitiveness Report. Certainly, the Swiss must be doing something right.

Indeed they are, says the Geneva-based World Economic Forum, which praises the country's transparent institutions, world-class infrastructure and education systems, flexible labor market, business acumen and, in particular, its capacity for innovation.

“Switzerland's top-notch academic institutions, high spending on R&D, and strong cooperation between the academic and business worlds contribute to making it a top innovator,” the group said.... “Productivity is further enhanced by an excellent education system and a business sector that offers excellent on-the-job-training opportunities. ...”

“In Switzerland, students make a career choice as early as eighth grade. I'm not kidding,” Dahinden¹² explained.... “At age 15 or 16, our teens begin to plan their future career. **Two-thirds of Switzerland's youth at that age do not opt for college,¹³ but for a career in a specific professional field.** We call this path apprenticeship (emphasis added).”

Dahinden should know. Besides being the former director-general of the Swiss Agency for Development and Cooperation, his 17-year-old son Robert is currently doing an apprenticeship in metal processing.

“As a father, I am proud, but I also have peace of mind knowing my son is going to hit the ground running when he finishes after four years of on-the-job and at-school training. I know he will find work. He will begin his life with no debt, ready to contribute to the community and to Switzerland's economy....”

Switzerland is home to one of the lowest unemployment rates on the continent yet, compared to other European countries, produces far fewer higher education graduates. While the university route is traditionally associated with better prospects and pay, it can also leave overqualified candidates competing for scarce jobs while saddled with high debt. One look at the enormous youth unemployment rates in countries like Greece and Spain (roughly 50 percent)

¹² Martin Dahinden, Switzerland's ambassador to the United States.

¹³ This percentage reflects findings that only around one-third of the American population possess the talents the current optimized academic system arbitrarily demands.

illustrates this problem. In contrast, **Germany and Austria are among the European countries with the least number of university-educated youth but they boast a very low youth unemployment rate** (emphasis added)...¹⁴

Like Germany and Austria, which boast strong apprenticeship programs, Switzerland created a vocational training system that prepares students for a wide range of careers to better meet market demands. That includes highly skilled jobs in areas such as information technology, advanced manufacturing and health care, as well as more traditional blue-collar trades and crafts....

Apprenticeships are now available for roughly 230 distinct occupations. About two-thirds of Swiss high school graduates enroll in such a program, and 90 percent of young Swiss adults hold upper-secondary-level qualifications.

... “After the apprenticeship, you can stay in the company or move to a university, or do an extra year of academics and move into the vocational system,” Hoffman said. “That’s why we think this is the gold standard.” Hoffman said on average, apprentices receive \$800 a month, rising to \$1,200 a month in the third year (minimum wage laws do not exist in Switzerland). About 30 percent of Switzerland’s companies participate in this system....

“Most [apprentices] still live with their parents. In this first year, they are not very interesting economics-wise for their companies,” he said. “But after the apprenticeship is over, they’re not in debt, like after college. They start their professional lives without debt. It’s different year by year, and there are no minimum salary requirements.”

Dahinden added: “It’s not only about acquiring skills. Young people learn to integrate themselves in the adult world, so they start working in a team with people of all ages. Also important is that they not only learn technical skills but how to work with clients, how to deal with procurement of materials – all those elements that are essential if somebody wants to start their own business after the apprenticeship.” By contrast, said the Labor Department’s Seleznow, the average apprentice in the United States is 27 or 28 years old.

Our system is very different. Many employers get involved in the educational system, but they are not part of the educational system like they are in Switzerland....

¹⁴ This reveals a mistaken notion in the U.S. that only college graduates will have jobs in the future. College graduates have higher employment rates within our current social conditions because if given a choice, employers may take the highest level of education available as long as they don’t have to pay more for the choice. However, if it comes down to the choice between a college graduate and someone with an appropriate certificate, an employer will choose the certified prospect over the graduate and will likely pay more for this person – I know this first hand because I have been faced with such hiring choices in my career. Individuals with certificates that correlate with job requirements would always be my first choice over any other credential. After all, I am not impressed with college degrees, but I am impressed with credentials that fit the needs at hand regardless of institutional “status.”

The World Economic Forum (2014-2015) reports on the rankings of industrialized nations. The following is what they offer for Switzerland and Finland:

The top of the rankings continues to be dominated by highly advanced Western economies and several Asian tigers. For the sixth consecutive year Switzerland leads the top 10....

Switzerland tops the Global Competitiveness Index again this year, keeping its 1st place for six years in a row. Its performance is stable since last year and remarkably consistent across the board: the country ranks in the top 10 of eight pillars. Switzerland's top-notch academic institutions, high spending on R&D, and strong cooperation between the academic and business worlds contribute to making it a top innovator. Switzerland boasts the highest number of Patent Cooperation Treaty applications per capita in the world. The sophistication of companies that operate at the highest end of the value chain constitutes another notable strength (2nd). Productivity is further enhanced by an excellent education system and a business sector that offers excellent on-the-job-training opportunities. The labor market balances employee protection with flexibility and the country's business needs (1st). Public institutions are among the most effective and transparent in the world (7th), ensuring a level playing field and enhancing business confidence. Competitiveness is also buttressed by excellent infrastructure and connectivity (5th) and highly developed financial markets (11th). Finally, Switzerland's macroeconomic environment is among the most stable in the world (12th) at a time when many European countries continue to struggle in this area. A potential threat to Switzerland's competitive edge might be the increasing difficulties faced by businesses and research institutions in finding the talent they need to preserve their outstanding capacity to innovate....

Demonstrating that an economy cannot long endure without the educational infrastructure needed to maintain it. The report continues with Finland.

Finland continues to exhibit a strong performance across all the analyzed dimensions, despite its drop of one place to 4th position. This decline is mainly driven by a slight deterioration of its macroeconomic conditions (43rd), which has led some rating agencies to downgrade the outlook of this Nordic economy. More precisely, Finland suffers from higher, though still manageable, deficit and public debt level, and its savings rate has slightly decreased. Nevertheless, the country continues to boast well-functioning and highly transparent public institutions (1st), at the very top in many of the indicators included in this category, and high-quality infrastructure (19th). The functioning of its products market is also good (18th), financial development is very high (5th), and the country manages to use its existing talent efficiently (7th) despite some persistent rigidities in its labor market, most notably in terms of wage determination (143rd), which is regarded as one of the most problematic factors for doing business. Its biggest competitiveness strength lies in its capacity to innovate, where the country leads

the world rankings (1st). Very high public and private investments in R&D (3rd), with very strong linkages between universities and industry (1st) coupled with an excellent education and training system (1st) and one of the highest levels of technological readiness (11th) drive this outstanding result.

I believe that these two economic powerhouses owe much of their standing to their educational systems, and their educational systems owe much to liberty and free market principles.

In using other country's as examples of successes, I believe there are still shortcomings in the bridge between applied and abstract instruction in these countries.

Vocational/polytechnic type of education and academic education tend to be disconnected from one another because the two cultures tend to be unfamiliar and therefore uncomfortable with one another. The concept I am proposing is to build a bridge between them so that the disrespect they tend to have for one another may be set aside and a middle ground might be found between these two poles.

The first step is to deflate the ego balloon of academia that tends to see itself as the superior way and therefore the superior choice of educational options. This I do throughout my essays by making bare just how out of touch with reality academia tends to be.

The next step is to address the questions "What is education for and what is it to accomplish for individuals and society?" After those questions are answered, we can then determine what is essential for individuals to learn, which will require the discarding of large amounts of superfluous information that now dominates curricula. Then, how best can we teach it so individuals will achieve deep learning with minimal amount of time and resources invested to accomplish this goal? Cognitive psychology will need to be consulted to help in this effort. Quality must be at the forefront of all effort, with quantity simply being a consequence of this, which is the inverse of the current system.

Challenges That Money Has Been Unable to Resolve

Cochrane and Kubitz (2016) demonstrate how low-income individuals face hurdles that make it very difficult to attain postsecondary credentials. The Table of Contents list some of the hurdles they face:

- Competing responsibilities: students and their families
- On the verge of homelessness: housing costs and insecurity
- Struggling to survive: food costs and insecurity
- To book or not to book: the cost of textbooks and supplies
- Getting to school: the cost of transportation
- Risky business: making costly financial choices to fill the gap
- When the job must come first: work as a barrier to completion

This list reveals the challenges young people face and why so many of them will never acquire the desired credentials, though lucrative credentials could have been achieved in high school at the public's expense before the life challenges listed became an issue. However, the Cochrane and Kubitz report calls for more financial assistance. Rather than scrutinize the educational establishment itself and why it is failing our youth, money is seen as the only remedy needed. If instead of looking to postsecondary education to provide the necessary credentials, we looked to secondary education (6th through 12th grades) to provide the source for so many credentials, we would make huge strides toward narrowing the gap between the haves and have-nots; or should I say, between those who the educational community favors (those with excellent memory and recall abilities) versus the average person!

[Nguyen and Cheche](#) (2024) put together a series of articles showing findings of a Community College Enrollment Survey (conducted by Lake Research Partners between Nov. 16 and Dec. 7, 2023) for students who had quit college and were asked why. The percent saying the “major reason” why they didn't return to their college is as follows:

- Had to work 49%
- Could no longer afford a program 31%
- Had a loss of self-motivation or ambition 27%
- Had to provide care for a child 24%
- The impact of inflation and rising prices 24%
- Had a personal health issue 23%
- There were more job opportunities 15%
- The overall uncertainty because of the economy 15%
- Had to provide care for another adult in my household 13%
- Did not have transportation to get to and from classes 13%
- Had a loss of employment 11%
- Did not want to take classes in the existing learning mode 11%
- Did not have the technology of internet access to take classes online 11%
- Other 10%

The survey goes into greater depth for each category but what is important for our present purposes is the lesson that our educational system is failing us miserably. The vast majority of those who quit college, with little to nothing to show for it, could have received credentials at the end of their secondary years while they were a captive audience. To wait until adulthood (18 year olds are adults) before preparing for an occupation, demonstrates a regulatory capture example whereby the education community uses the power of government to kidnap our youth (through [child labor laws](#) and [compulsory laws](#), i.e., seat-time in contrast to competency) until educators are able to extract as much of our resources as possible for their selfish and politically motivated purposes.

The dual-enrollment option – concurrent enrollment in high schools and community colleges – is an excellent example of one way to address the needs of our youth in order to acquire credentials. It reveals that high schools have become antiquated and, in large

part, unnecessary since students can achieve all they need in a community college to prepare for a career or for more college. So why wait? Why not begin college when middle school is completed? Choices such as general education,¹⁵ applied education, or career technical education should be offered that lead to real-world results.

It is time we recognize that the current secondary system is something that was ill conceived and designed around the turn of the last century when State and local bureaucracies became the fad and took over education.¹⁶ Ignoring this reality tends to divert educational research effort away from the real problem and toward more and more education. We are already seeing the effect this is having on economic returns for those with bachelor's degrees – it is eroding, which is exactly what happened to the high school degree from around 1900 to the 1970s. This time frame is so long that few are able to discern the problem due to the misguided belief in the status and prestige more education bestows upon individuals and their families. This unwise belief system will drive the need for more education in order to stay ahead in the race for “success” – whatever that might mean to individuals. The flaw in this belief system becomes apparent when we consider that the credential is where the value comes from rather than from the knowledge acquired in its pursuit. This is made evident when we consider that one can go through a postsecondary program and be one credit short of graduation, and therefore be unable to acquire the credential, and end up in the same statistical grouping as one who possesses only a high school degree. Therefore, it is not the knowledge that has economic value, but rather the credential. If this isn't flawed reasoning, I don't know what is.

Essays I Offer To Help Shed Light On Our Dilemma

Below, I include excerpts from my various essays to introduce the reader to what they cover. In this way the reader can determine if an essay is of any interest to delve into.

The first essay is titled *The Applied Education Concept*. The concept was first conceived as a means to provide a different type of education for that segment that is currently not being well served by the public educational system due to its primary focus being college prep (which adequately serves between 15 to 20% of the population) or narrowly focused vocational programs (which currently serves approximately 10% of the population). The segment that falls between these two is the largest segment of the school age population. The college prep program lives almost exclusively in the disconnected abstract realm, void of connection to relevant real-world phenomena; while vocational programs live predominately in the narrowly tailored, hands-on realm with insufficient theory supporting a deeper and broader understanding of the world – though this narrow focus may be a thing of the past with the current evolution of CTE. The intent of the applied

¹⁵ St. John's College in Annapolis, Maryland provides an excellent example of what a general education might entail – at least portions of their program. This is a liberal arts college that teaches people to reason, amongst other mental attributes, which is utterly absent from current high school programs.

¹⁶ See Kliebard, Herbert M., *The Struggle for the American Curriculum: 1893-1958*, RoutledgeFalmer, 2004.

education concept is to couple the two and to bridge knowledge between the various subjects/disciplines that are to be taught.

Bowen (1972) points to the problem our country has faced for as long as academics have controlled the educational establishment: “There is the rivalry between liberal and technical education with their respective antagonists considering the former a meaningless and decadent social ideal, the latter an illiberal and mindless kind of vocational training.” People tend to assert that that which is most important to “me” should be equally important to everyone else as well. It is a human weakness that we have yet to come to terms with.

There is a resistance from the academic community as it relates to the need for change from an almost exclusively disconnected abstract world – which is so important to academics – to an applied one – which is typically foreign to academics and therefore uncomfortable to them. Historically, academics perceive utilitarianism as belonging to the “laboring classes” and therefore shun it as beneath them. In addition, they believe those who must labor in any fashion must be serfs of some imaginary bogeyman. In this cultural mindset, no one should have to study to be in the “laboring classes,” and academics certainly want no part of it; therefore it is an unacceptable program of study due to their misguided prejudices. Working with one’s hands is abhorrent to them, even though surgeons are glorified mechanics who deserve all kinds of accolades in the minds of academics. The hypocrisy is glaring.

In the latter half of the twentieth century, the mistaken notion that everyone can and should get a college degree came to prevail over the minds of academics and citizens. It is stated that those with college degrees, on average (and this statistical “on average” is an important and misleading caveat that will be considered in other essays), have higher incomes than those with only a high school degree or industry certificate. This is true “on average,” which is due in large part to cultural biases unrelated to ability, skill, or knowledge along with the high wages professional degrees provide. Instead of addressing the reasons and biases for this situation, we simply accept the belief that the academy is the only path to success.

Currently, a majority of the population is simply passed through the system until they either quit school or graduate, regardless of comprehension of material taught. A large portion that go on to college require remedial classes and most will not complete these classes or, in the end, will not complete a college program, yet they will be burdened with debt but with no economic benefits.

With the high school non-completion rate at approximately 25 to 30%,¹⁷ and with college non-completion rates also showing dismal numbers, a large sector of our youth, for all intents and purposes, are disenfranchised. In particular, disadvantaged socioeconomic

¹⁷ The data for high school graduation rates are far too unreliable to know what the actual numbers are. In addition, those who passed a GED exam are included in high school completion rates, which is not at all appropriate. Also see Dynarski, Mark, *Is The High School Graduation Rate Really Going Up?*, Brookings, May 3, 2018.

youth are most vulnerable. Upon graduation from high school, this sector is left to its own devices with little to no guidance and with no preparation for what they will face in the real world. The general education disciplines of academia are not transferable to the working world. When adolescents should learn skills that are necessary for life, during their age-sensitive stages of development, they are instead expending the majority of their time and energy on useless academic and disconnected abstract fields of study.

In an attempt to address such challenges, I propose an applied education program, which is an innovative concept for middle and high school levels (hereafter collectively referred to as secondary school) designed for the largest sector of the school age population. The program would seek to connect disciplines that have heretofore *appeared* to be unrelated to one another. Conceptually, it is a program focused on developing knowledge – combining application with theory – necessary for pursuing a career and participating in a civil society.

The concept is meant to fill a very large void that currently appears to go unnoticed.

My essay, *A Lesson in Educational History to Help Explain Our Current State of Affairs*, is intended to analyze educational history in order to understand how our educational system arrived at its current form. We need to discover the good that may have been lost from the past, as well as the poor choices that were made at certain forks in the road.

History, of whatever subject one studies, offers insights into the forces at play that shaped contemporaneous conditions. The history of education reveals the good and the bad from the past, and it is sometimes surprising that what we've been taught as a social good is not always what it seems. Certain individuals and events do not quite stack up to our glorification of them. Just because people's hearts were in the right place doesn't mean they made the right choices or chose the lesser of evils they were presented with.

We may observe from Mesopotamia, Egypt, classical antiquity, and the Renaissance eras that formal education was developed and refined for and by the leisure classes. Formal education was taken to great heights on their behalf, but education for the rest was typically not addressed. The Italian Renaissance was an exception, where there was recognition for the need to train certain sectors, outside the gentry, in commerce and the crafts. This may explain why even the poorest citizens of Renaissance Florence had a higher standard of living than had previously been seen by the poor. In addition, brilliant artisans were products of this outstanding applied educational system, in conjunction with a highly developed apprenticeship system that was designed for the laboring classes.

Please note that unlike the academic community, I do not disparage labor. Like Renaissance Italians, I hold it in very high esteem and therefore see great value in developing a comprehensive educational system geared to develop high levels of economic skills in all of their manifestations. Individual wealth is thereby increased substantially for all walks of life. This will be one of the primary objections from the academic community, since they do not believe education should be “merely vocational,”

and it demonstrates why they cannot be trusted with our fate. They have done great harm to many millions of lives due to their prejudices.

My essay, *What is the Purpose of an Education System?*, addresses the complexity of this question. Fundamentally, I reject the one-size-fits-all approach we currently labor under, which is rooted in the uniquely American comprehensive high school (all students are funneled through the same system regardless of their individual needs) that was adopted early in the last century.

In essence, education must be as complex as society since it is to prepare individuals for participation in it. However, at the personal level, what education means is an individual concern that is as unique as individuals may be, and individuals are free to expand their minds as far and wide as they desire once the fundamentals are acquired.

Yet when it becomes a social or public question, this narrows things down considerably, since there are very general needs that every citizen has in common, which is a thorough grounding in literacy and numeracy at the primary level. As individuals advance in education, there are still common elements everyone needs, such as the understanding of civics – an absolute necessity in a free republic in order to curb the ambitions of sophists, socialists, and statist types – and preparing for an economic livelihood. However, there are those in the educational establishment that assert education is to develop “a well-rounded person” – a holdout from education’s aristocratic origins. While this is a noble objective, and one people should be encouraged to pursue, this is not society’s responsibility. I think this understanding becomes self-evident when we see how miserably and completely education fails in this goal; yet it is still used as the reason to maintain the status quo. The educational system is filled with such glaring contradictions.

In this essay I consider what some of the renowned educational reformers had to say on the subject of the purpose of education to find common elements, like a thread through time. The test of time helps reveal the validity of ideas, decisions and actions. I base this on the principles of English Common Law, as explained by the jurist Sir Matthew Hale¹⁸ (1609-1676); and principles of objective and subjective laws as expressed by another jurist, Henry Bracton (c. 1210 – c. 1268): There are *universal laws* (objective laws) that are true in all places and at all times; there are *human laws* (also objective laws) that are true in all places and at all times; and then there are *civil laws* (which are subjective laws) that are relative to place and time. The common theme that can be observed through the writings of various educational reformers over extended periods of time¹⁹ allows us to discover the *human laws* and *civil laws* as they relate to education – that is, what all

¹⁸ Hale, Matthew, *The History of the Common Law*, University of Chicago Press, 1971. As time marches forward and cases come before courts, precedent is analyzed to determine its fitness to a case at hand but also the effects it has had on the community. If it is relevant to the case before the court, the judge must then consider its effects on the community. If they have been positive, then the precedent must stand; but if they have been negative, then the precedent must either be modified or overturned. In this way, equity is revealed to society through the test of time.

¹⁹ This is similar to *The Great Conversation*, which may be defined as “The tradition of the West is embodied in the Great Conversation that began in the dawn of history and that continues to the present day.” <http://www.thegreatideas.org/libeducation.html>

humans need regardless of time or place coupled to what people need in a given community that **is** related to time and place.

My next essay, ***How Much Education is Really Necessary?***, addresses what is worthy of an individual's time and what constitutes knowledge that has substantive value to individuals? Spencer (1860) addresses this question in a succinct manner based on an analysis of *relative worth*:

The question which we contend is of such transcendent moment, is, not whether such or such knowledge is of worth, but **what is its relative worth?** When they have named certain advantages which a given course of study has secured them, persons are apt to assume that they have justified themselves: quite forgetting that **the adequateness of the advantages is the point to be judged.** There is, perhaps, not a subject to which men devote attention that has not *some* value. [*Spencer proceeds to provide examples of relatively useless learning.*] ... But in these cases, every one would admit that there was no proportion between the required labor and the probable benefit. **No one would tolerate the proposal to devote some years of a boy's time to getting such information, at the cost of much more valuable information which he might else have got.** And if here the test of relative value is appealed to and held conclusive, then should it be appealed to and held conclusive throughout? **Had we time to master all subjects we need not be particular. ... Before devoting years to some subject which fashion or fancy suggests, it is surely wise to weigh with great care the worth of the results, as compared with the worth of various alternative results which the same years might bring if otherwise applied.** (Emphasis added.)

[W]hile every one is ready to endorse the abstract proposition that instruction fitting youths for the business of life is of high importance, or even to consider it of supreme importance; yet scarcely any inquire what instruction will so fit them. ... While the great bulk of what else is acquired has no bearing on the industrial activities, an immensity of information that has a direct bearing on the industrial activities is entirely passed over.

Besides what subjects to teach, let's consider the depth at which a discipline needs to be delved into through the idea of *the cascade effect*: The way to determine what depth of knowledge is required by individuals on a given subject or discipline is to consider the level of understanding required by all citizens first and then by individuals as they decide on an economic sector to focus at some point in their years of education. *Stages* of development and individual *choices* – correlated with their talents/abilities – will determine this. It makes no sense for an individual to invest a great deal of time into a realm where talent and ability are absent. Applied studies goes a long way in observing abilities in individuals that disconnected abstract studies struggle to identify.

Stages are related to age and requirements of future stages. Stages will end when it is understood individuals will have no need of delving into a subject any further based on chosen paths (continuing education is needed periodically to stay abreast of change in

any field). However, some subjects may incorporate other subjects as further support. For example: Someone pursuing finance requires further math instruction, but not necessarily in a formal math class after a certain competency of math has been achieved. Certainly a financier has no need of trigonometry other than to understand its purpose in the world. That is, to have respect and appreciation but without the need for the mastery of it.

Choices are based on the talents of individuals and the resources available in a community. The cascade effect takes into account that on any given subject, we can go as far as current science allows or only to the level that is useful to individual's personal and social needs so that time and resources are not wasted on learning concepts not in the realm of *relative worth*. An example of the cascade effect can be shown by considering meteorology: When we teach the subject of clouds, we can identify their names, how they were formed, how they may help predict patterns in forecasting weather conditions, and the effects of weather patterns on our lives. However, do we want to explain to students a depth of understanding that only meteorologists will use when developing models with which to forecast weather used by the National Oceanic and Atmospheric Administration? Obviously not, so discernment must be used when formulating curriculum.

In my essay, *The Economics of It All*, I point out how many in the political and academic communities assert that our society must pursue a “college for all” scenario. It is believed this is necessary to remain internationally competitive, to provide opportunity for everyone to “rise to the top,” and to eliminate poverty. While there is truth in the need for better education, it does not necessarily follow that there must be more.

It is believed that improving individuals' abilities to achieve higher test scores is all that is needed without any other considerations. The idea is that if students improve scores, they can get into a college. As long as they finish college, everything will be great. This contradicts what facts tell us.

Vedder et.al (2013), from the Center for College Affordability and Productivity, list the shortcomings in arguments made for more schooling; in particular, over-credentialing through formal education programs. They state, “Increasing numbers of recent college graduates are ending up in relatively low-skilled jobs that, historically, have gone to those with lower levels of educational attainment.” The following are some of the points they make:

- “About 48% of employed U.S. college graduates are in jobs that the Bureau of Labor Statistics (BLS) suggests requires less than a four-year college education
- The proportion of overeducated workers in occupations appears to have grown substantially; in 1970, fewer than 1% of taxi drivers and 2% of firefighters had college degrees, while now more than 15% do in both jobs
- About 5 million college graduates are in jobs the BLS says require less than a high-school education

- Not all majors are equal: Engineering and economics graduates, for example, typically earn almost double what social work and education graduates receive by mid-career
- Past and projected future growth in college enrollments and the number of graduates exceeds the actual or projected growth in high-skilled jobs, explaining the development of the underemployment problem and its probable worsening in future years
- Rising college costs and perceived declines in economic benefits may well lead to declining enrollments and market share for traditional schools and the development of new methods of certifying occupation competence.”

The last point is a natural outcome when supply exceeds demand of a given product/service, especially when prices rise faster than any other economic sector.

Additional points should be added to the list that Vedder and his colleagues provide:

- “45% or so of those entering college fail to graduate within 6 years
- Not everyone earns the average [income level of a college graduate] – maybe one-third of those who graduate make at least 20% less than the average
- A large proportion of the earnings gains associated with attending college come only upon completion of the college degree”
- The college debt burden has become overwhelming with many defaulting on loans
- If a degree is not achieved, or a degree is attained that has little to no demand in the marketplace, college loan repayments frequently make life worse since there is typically no earnings gain for either scenario but a mountain of debt must be repaid. This reveals that the “knowledge” acquired in a university has little value in many cases. Only the diploma has value. This is why competency based type of education is growing rather quickly.

The authors reveal the growing disconnect between what academia offers and what citizens, employers, and society need.²⁰ They show “that in some categories of occupations historically almost completely shunned by college graduates, recent college graduates are effectively crowding out those with lesser education for jobs.” With such an excess in supply of over-educated individuals – who will work for the same wages as high school non-completers – it is no wonder those with postsecondary credentials have a lower unemployment rate than their lesser educated brethren.

My essay, *Quality of Education*, could certainly have been connected with the essay, *How Much Education Is Really Necessary*, since quality and quantity are coupled; yet quantity alone does not correlate with quality. Quality is the priority with quantity being

²⁰ This is nothing unusual, as Quigley (1964) explains. People join forces in new associations to improve some social need, but in time the association evolves into an institution where its members marginalize the original intent of their compact and become more concerned with their own interests, which comes at a high cost to society.

ancillary. However, the current state of education has become the inverse of this, where quantity is the primary measure and quality subordinate and, in so many cases, completely ignored.

Our bureaucratic system does not allow for quality to develop, since monopolistic forces seek convenience and ease of work for those within the bureaucracy rather than improvements for citizens. It's simply the nature of the beast.

The design of curricula is an odd phenomenon: Instead of providing information for the needs of the average person on a given subject, curriculum is designed and taught as though every individual will become a specialist in that subject. Introductory courses on subjects are designed to introduce individuals to a career in that field. This is nonsensical, yet it is done for every subject in schools. Curricula need an overhaul in public schools so that subject matter fits the needs of those who have no intention of pursuing a career in a given subject area. It must be designed to be useful to the average person; otherwise it has no place in K-12 public education.

There are those in the academic community, especially those in the math and science fields, who are not interested in helping all students learn their subjects, but rather see their job as the screeners to *weed out the inept*. This is not so much the case in the primary grades, as it is in the secondary and post-secondary levels where individuals' fates are being decided. One may even make a case that many academics do violence to citizens by barring them from opportunity, thereby relegating them to the margins of society. Only in academia is such violence tolerated. The mental anguish produced through such abusive behavior may be fertile grounds for citizens to seek damages due to the pain and suffering caused.

Humans tend to be a greedy lot in all walks of life, not just in capitalistic environments, as many academics would have us believe. Academics are no different from anyone else, so they erect barriers around their domain in order to protect it and keep it elevated from the "vulgar masses." The masses are allowed to enter the lower levels, which feed the academics, but the higher levels are jealously guarded with all sorts of landmines, pitfalls, and snares. Rather than eliminate these traps to provide equality of opportunity, academics say "let's throw more money at the problem." This provides more capital for their benefit, but kicks the can down the road for society. At least they can claim they are trying to remedy the problem, as deceitful and wasteful of public resources as that might be.

For the reasons provided above, the word *quality* has no place in the current secondary public education culture. What we have is plenty of *quantity*, with little to show for it. The fact that, through a dual-enrollment program, eighteen-year-old students can graduate high school with an associate's (and in some cases, a bachelor's degree, such as in Central High School of Philadelphia) demonstrates that the current system has become antiquated.

The Transfer of Learning: Why the Public System Fails to Achieve It: Fundamentally, the problem with our educational system – besides the destructive nature of centralization of government power – is this: It has been optimized for a particular set of talents that serve approximately 15 to 20% of the school age population. These talents are predominately abstract in nature and include the ability to memorize and recall raw disconnected data for assessment tests – the gateway to lucrative credentials. Rather than teaching for transfer of learning, instruction is designed for assessment tests.

Mestre et al. (2005) sum it up well: “Recently, we argued that the first and only instructional goal should be to teach for long-term retention and transfer. Of course, we are not alone in this; rather, we are members of a chorus declaiming the importance of transfer.”

Mestre et al. address the role of education: “The fundamental idea behind education is to teach knowledge and skills that will allow one to function better outside the classroom.” They also offer this as a description of measuring transfer: “[T]ransfer [is] measured as [the] ability to apply knowledge flexibly across varying contexts.” Combine the ideas expressed in these two statements and we get: *Education is to teach knowledge and skills that can be applied flexibly across varying contexts outside the classroom.* Currently, this is done primarily in career technical education (CTE) classes or college programs that are also career-oriented in applied realms, such as engineering, medicine, finance, etc.

As it relates to determining the effectiveness of teaching strategies for transfer, Mestre offers:

Multiple researchers have looked at the effects of schooling on transfer to everyday situations, often with gloomy results. ... [M]ost transfer-inspired methodologies cannot detect whether school prepares people to learn more effectively than if they had not had school experiences.... An instructional program that successfully inculcates skills, but for which the skills do not transfer to nonacademic situations outside the classroom, is a failure. Simply put, no one cares about learning if it stops at the schoolhouse door.

However, many academics only understand how to teach for more schooling. This is due largely to the design of curricula, which is disconnected from real world needs. This mindset is rooted in “developing a well rounded individual” and “learning for its own sake.” The only rewards academics tend to recognize are good grades, academic credentials, plus academic awards and honors, which are rooted in status and prestige (which can be meted out only sparingly if they are to retain any value) rather than substantive accomplishments.²¹ Here lies the fundamental disconnect that bars teaching for transfer. If the goal in the academic community is to achieve these illusory ends that are closely guarded in order to retain their value, then reality will always remain hidden from view.

²¹ Whereas Markowitz (2018) points out that 80% of students cite the prospect of a job as one of the main reasons for pursuing an education.

To my knowledge, Haskell (2001) provides the best account of what transfer is and an analysis of our educational system's failure to provide for it:

The aim of all education, from elementary, secondary, vocational, and industrial training, to higher education, is to apply what we learn in different contexts, and to recognize and extend that learning to completely new situations. Collectively, this is called *transfer of learning*. Indeed, it's the very meaning of learning itself. Although some disagree, most researchers and educational practitioners ... agree ... that meaningful transfer of learning is among the most – if not *the* most – fundamental issue in all of education. They also agree that transfer of learning seldom occurs.

The issue of transfer, then, is an extremely serious one for individuals, schools, business, and society. It's especially important given findings that the average person will change vocations (not merely job locations) five times in the span of his life. The particular information and concrete strategies learned to navigate one's chosen profession quickly become outmoded, not once but many times. We need to teach information and thinking that will transfer.

... [T]he concern about transfer of learning becomes increasingly salient in a world where rapid scientific and technological change often penalizes those who are narrowly skilled and mentally inflexible.

Willingham (2009) references research done on prominent scientists who were interviewed and took personality and intelligence tests.

The results of these studies are fairly consistent in one surprising finding. The great minds of science were not distinguished as being exceptionally brilliant, as measured by standard IQ tests; they were very smart, to be sure, but not the standouts that their stature in their fields might suggest. What *was* singular was their capacity for sustained work. Great scientists are almost always workaholics. ... Great scientists have incredible persistence, and their threshold for mental exhaustion is very high. (pp. 138-39)

So teaching for tests and subsequent test results do not determine success. Rather, personality traits are the primary determinants in achieving results. Transfer of learning, therefore, must be learned outside formal education institutions given current design.

Conclusion

The educational establishment has been optimized through an old and established culture. It automatically alienates those who are not of the same mindset of this culture. Therefore, the entrenched culture is stuck, since no one who would challenge it is part of it – trailblazers won't become a part of the culture because they can't identify with its institutional values. This demonstrates why an institutional approach to something as important as education is a dangerous situation. It's stuck, and to change something as

entrenched as the academic establishment, is next to impossible as long as it remains an institution. If the institution is broken up by removing power and influence from Washington D.C., from the unions, from accreditation organizations, and from test making companies, we then stand a chance of designing curricula that benefits the vast majority of citizens – a paradigm shift to be sure. Middle and high school curricula can then be designed to benefit the diverse needs of students instead of the institutional Leviathan that demands the lion’s share of the resources be expended for its own entrenched consumption.

No doubt, there will be those who will criticize my work for being too harsh on academia, however, change cannot and will not occur when one attempts to conceal harsh realities or appease those who have a vested interest in the status quo. It’s simply the nature of the beast.

Thomas Paine’s analysis of government in his classic, *Common Sense*, provides instruction in what we currently face with an omnipotent educational establishment:

I draw my idea of the form of government from a principle in nature which no art can overturn, viz. that the more simple any thing is, the less liable it is to be disordered, and the easier repaired when disordered; and with this maxim in view I offer a few remarks on the so much boasted constitution of England.

... Absolute governments, (tho' the disgrace of human nature) have this advantage with them, they are simple; if the people suffer, they know the head from which their suffering springs; know likewise the remedy; and are not bewildered by a variety of causes and cures. But the constitution of England is so exceedingly complex, that the nation may suffer for years together without being able to discover in which part the fault lies; some will say in one and some in another, and every political physician will advise a different medicine.²²

As a postscript, Tucker (2019) compares the failing U.S. system to highly successful education systems around the globe.

It turns out that the top-performing systems are top performing mainly because they have better designed *systems*, the parts and pieces of which are working in harmony with each other. When they change any part of their system, they look first to make sure that the new piece will work as well or better with the other parts and pieces than the part that is being replaced with the new policy or practice.

... The problem of avoiding a systems-level view runs deep. It is rooted in our shared conception of the best way to improve student performance. That conception is based on the way we do education research and evaluation. The idea is borrowed from clinical medicine, the way we do medical research: Identify a

²² “Of the Origin and Design of Government in General, with Concise Remarks on the English Constitution” <http://www.ushistory.org/paine/commonsense/sense2.htm>

disease or condition, identify possible treatments and then conduct controlled experiments to measure the effects of the treatment on the condition or disease, having controlled for all the other possible factors that might have produced the observed effects. But the adoption of the clinical medicine model has proven to be a terrible handicap.

“What’s wrong with it?”, you ask. “It has produced enormous improvements in the health sector, why not in education?” Because there is an enormous difference between education and health. In the case of human health, the design of the system is a given. It is the design of a human being. The purpose of medical research is not to design a better human being. It is to address disorders within that system. So, it makes sense to isolate specific disorders and isolate treatments of those disorders and look for treatments that will reliably address the disorders under stated conditions [while hopefully having little to no effect on any other part of the system].

In the case of education, *the issue is the design of the system*. NCEE’s research on education systems all over the world makes this abundantly clear. There is very little magic in the “treatments.” Everyone knows, for example, that students will perform better if they come to school ready for the curriculum the school offers, if that curriculum is set to high standards and taught by highly-qualified teachers who have high expectations for their students. Those points are not in dispute. The question, rarely asked in the United States, is how to design and implement well-constructed, highly-integrated systems that run that way, reliably, for all students.

[Education researchers look in convenient places, but which turn out to be in the wrong places.] What’s worse is we may be looking for the wrong thing to begin with. We look for silver bullet solutions, using a research paradigm that was brilliantly designed to produce information about the effectiveness of silver bullet solutions, but we fail to realize that what we are doing is finding out which silver bullets will produce marginally better results in a highly dysfunctional system, a system that was designed more than a century ago for a very different world. Those silver bullets may or may not work in a more functional system. We’ll never know because we would find out only if we had a better functioning system.

What we should be doing is researching high-performance systems [elsewhere] so we can learn what we need to learn to build and run *high-performance systems* that are as good as the world’s best. But the American education research establishment, caught up in a model of education research that is highly inappropriate, has exhibited no interest in doing that.

Why? Because the social structure of the American education research establishment rewards people who have developed a high level of technical mastery of the methods that the establishment has blessed and validated and

because policymakers are socialized to act on the findings from that kind of research. After decades and billions of dollars of expenditure, the education research establishment, by and large, does not know how to reliably identify the factors that account for success in large-scale education systems.

Note to the reader: The contemporary *politically correct* issue raging in our culture is to identify people in racial groups and to focus social changes based on group politics. In large part, I ignore this manipulative strategy of re-engineering society. I see people as people and subscribe to the principles laid out by the National Academy of Sciences, Appendix C: Study Populations in Research on Learning (2018):

[O]vergeneralizing can dangerously blind one to people's complexities, nuances, and variability. ... [A]ttempting to fit individuals within a single descriptor of race or culture and then generalizing the results of the research to a broader population is highly problematic for a number of reasons. (p. 315)

Appendix

The National Research Council published an excellent work on cognitive psychology, *How People Learn: Brain, Mind, Experience, and School*, National Academy of Sciences, National Academy Press, 2000. From this work I provide expansive quotations that support the need for an applied education program and insert my personal comments in the text using brackets and italicized font to distinguish my comments from the authors' work. In particular I borrow freely on the analysis of what constitutes an expert or mastery in any given endeavor. It shows how we learn and how important it is to apply knowledge for it to sink-in rather than simply memorizing information for tests.

I decided to provide this information in an appendix rather than the body of my essay due to its in-depth character in the specialized field of cognitive psychology, which is beyond the scope of my introduction to the Applied Education Foundation, yet it provides strong evidence for the justification in founding this organization and the need for support.

To develop competence in an area of inquiry, students must: (a) have a deep foundation of factual knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) organize knowledge in ways that facilitate retrieval and application.

This principle emerges from research that compares the performance of experts and novices and from research on learning and transfer. Experts, regardless of the field, always draw on a richly structured information base; they are not just 'good thinkers' or 'smart people.' The ability to plan a task, to notice patterns, to generate reasonable arguments and explanations, and to draw analogies to other problems are all more closely intertwined with factual knowledge than was once believed.

But knowledge of a large set of disconnected facts is not sufficient. To develop competence in an area of inquiry, students must have opportunities to learn with understanding. Deep understanding of subject matter [*that can be achieved primarily through application*] transforms factual information into usable knowledge. A pronounced difference between experts and novices is that experts' command of concepts, shapes their understanding of new information: it allows them to see patterns, relationships, or discrepancies that are not apparent to novices. They do not necessarily have better overall memories than other people. But their conceptual understanding allows them to extract a level of meaning from information that is not apparent to novices, and this helps them select and remember relevant information. Experts are also able to fluently access relevant knowledge because their understanding of subject matter allows them to quickly identify what is relevant. Hence, their attention is not over-taxed by complex events (pp. 16-17).

Research shows that it is not simply general abilities, such as memory or intelligence, nor the use of general strategies that differentiate experts from

novices. Instead, experts have acquired extensive knowledge that affects what they notice and how they organize, represent, and interpret information in their environment. This, in turn, affects their abilities to remember, reason, and solve problems.

... We discuss these examples not because all school children are expected to become experts in these or any other areas [*though this is exactly how subjects such as math, science and English are taught*], but because the study of expertise shows what the results of successful learning look like.

... We consider several key principles of experts' knowledge and their potential implications for learning and instruction:

1. Experts notice features and meaningful patterns of information that are not noticed by novices.
2. Experts have acquired a great deal of content knowledge that is organized in ways that reflect a deep understanding of their subject matter.
3. Experts' knowledge cannot be reduced to sets of isolated facts or propositions, but, instead, reflects contexts of applicability: that is, the knowledge is "conditionalized" on a set of circumstances.
4. Experts are able to flexibly retrieve important aspects of their knowledge with little attentional effort.
5. Experts have varying levels of flexibility in their approach to new situations (p. 31).

One of the earliest studies of expertise demonstrated that the same stimulus is perceived and understood differently, depending on the knowledge that a person brings to the situation. DeGroot (1965) was interested in understanding how world-class chess masters are consistently able to outthink their opponents. Chess masters and less experienced, but still extremely good, players were shown examples of chess games and asked to think aloud as they decided on the move they would make if they were one of the players. DeGroot's hypothesis was that the chess masters would be more likely than the non-masters to (a) think through all the possibilities before making a move (greater breadth of search) and (b) think through all the possible countermoves of the opponent for every move considered (greater depth of search). In this pioneering research, the chess masters did exhibit considerable breadth and depth to their searches, but so did the lesser-ranked chess players. And none of them conducted searches that covered all the possibilities. Somehow, the chess masters considered possibilities for moves that were of higher quality than those considered by the lesser-experienced players. Something other than differences in general strategies seemed to be responsible for differences in expertise.

DeGroot concluded that the knowledge acquired over tens of thousands of hours of chess playing enable chess masters to out-play their opponents. Specifically, masters were more likely to recognize meaningful chess configurations and

realize the strategic implications of these situations; this recognition allowed them to consider sets of possible moves that were superior to others. The meaningful patterns seemed readily apparent to the masters, leading DeGroot to note: “We know that increasing experience and knowledge in a specific field (chess, for instance) has the effect that things (properties, etc.) which, at earlier stages, had to be abstracted, or even inferred are apt to be immediately perceived at later stages. To a rather large extent, abstraction is replaced by perception, but we do not know much about how this works, nor where the borderline lies” (p. 32).

The superior recall ability of experts ... has been explained in terms of how they ‘chunk’ [*arrange*] various elements of a configuration that are related by an underlying function or strategy. Since there are limits on the amount of information that people can hold in short-term memory, short-term memory is enhanced when people are able to chunk information into familiar patterns (p. 32-33).

The idea that experts recognize features and patterns that are not noticed by novices is potentially important for improving instruction. When viewing instructional texts, slides, and videotapes, for example, the information noticed by novices can be quite different from what is noticed by experts. One dimension of acquiring greater competence appears to be the increased ability to segment the perceptual field (learning how to see). Research on expertise suggests the importance of providing students with learning experiences that specifically enhance their abilities to recognize meaningful patterns of information (p. 36).

We turn now to the question of how experts’ knowledge is organized and how this affects their abilities to understand and represent problems. Their knowledge is not simply a list of facts and formulas that are relevant to their domain; instead, their knowledge is organized around core concepts or “big ideas” that guide their thinking about their domains.

In an example from physics, experts and competent beginners (college students) were asked to describe verbally the approach they would use to solve physics problems. Experts usually mentioned the major principle(s) or law(s) that were applicable to the problem, together with a rationale for why those laws applied to the problem and how one could apply them. In contrast, competent beginners rarely referred to major principles and laws in physics; instead, they typically described which equations they would use and how those equations would be manipulated.

Experts’ thinking seems to be organized around big ideas in physics, such as Newton’s second law and how it would apply, while novices tend to perceive problem solving in physics as memorizing, recalling, and manipulating equations to get answers.

... Experts' problem piles are arranged on the basis of the principles that can be applied to solve the problems; novices' piles are arranged on the basis of the problems' surface attributes (pp. 36-38).

The fact that experts' knowledge is organized around important ideas or concepts suggests that curricula should also be organized in ways that lead to conceptual understanding. Many approaches to curriculum design make it difficult for students to organize knowledge meaningfully. Often there is only superficial coverage of facts before moving on to the next topic; there is little time to develop important, organizing ideas. History texts sometimes emphasize facts without providing support for understanding. Many ways of teaching science also overemphasize facts.

The Third International Mathematics and Science Survey (TIMSS) criticized curricula that were "a mile wide and an inch deep" and argued that this is much more of a problem in America than in most other countries. Research on expertise suggests that a superficial coverage of many topics in the domain may be a poor way to help students develop the competencies that will prepare them for future learning and work. The idea of helping students organize their knowledge also suggests that novices might benefit from models of how experts approach problem solving – especially if they then receive coaching in using similar strategies.

Context and Access to Knowledge

Experts do not have to search through everything they know in order to find what is relevant; such an approach would overwhelm their working memory. For example, the chess masters described above considered only a subset of possible chess moves, but those moves were generally superior to the ones considered by the lesser-ranked players. Experts have not only acquired knowledge, but are also good at retrieving the knowledge that is relevant to a particular task.

... The concept of conditionalized knowledge has implications for the design of curriculum, instruction, and assessment practices that promote effective learning. Many forms of curricula and instruction do not help students conditionalize their knowledge: 'Textbooks are much more explicit in enunciating the laws of mathematics or of nature than in saying anything about when these laws may be useful in solving problems' (Simon, 1980:92). It is left largely to students to generate the condition-action pairs required for solving novel problems.

... [S]tudents in a literature class might be asked to explain the meaning of familiar proverbs, such as 'he who hesitates is lost' or 'too many cooks spoil the broth.' The ability to explain the meaning of each proverb provides no guarantee that students will know the conditions under which either proverb is useful. Such knowledge is important because, when viewed solely as propositions, proverbs often contradict one another. To use them effectively, people need to know when and why it is appropriate to apply the maxim 'too many cooks spoil the broth'

versus ‘many hands make light work’ or ‘he who hesitates is lost’ versus ‘haste makes waste’ (pp. 42-44).

Fluent Retrieval

People’s abilities to retrieve relevant knowledge can vary from being ‘effortful’ to ‘relatively effortless’ (fluent) to ‘automatic.’ Automatic and fluent retrieval are important characteristics of expertise.

Learning to drive a car provides a good example of fluency and automaticity. When first learning, novices cannot drive and simultaneously carry on a conversation. With experience, it becomes easy to do so. Similarly, novice readers whose ability to decode words is not yet fluent are unable to devote attention to the task of understanding what they are reading (p. 44).

Expertise in a particular domain does not guarantee that one is good at helping others learn it. In fact, expertise can sometimes hurt teaching because many experts forget what is easy and what is difficult for students. Recognizing this fact, some groups who design educational materials pair content area experts with ‘accomplished novices’ whose area of expertise lies elsewhere: their task is to continually challenge the experts until the experts’ ideas for instruction begin to make sense to them (Cognition and Technology Group at Vanderbilt, 1997). ... [T]eaching strategies differ across disciplines (44-45).

Adaptive Expertise

An important question for educators is whether some ways of organizing knowledge are better at helping people remain flexible and adaptive to new situations than others. For example, contrast two types of Japanese sushi experts (Hatano and Inagaki, 1986): one excels at following a fixed recipe; the other has ‘adaptive expertise’ and is able to prepare sushi quite creatively. These appear to be examples of two very different types of expertise, one that is relatively routinized and one that is flexible and more adaptable to external demands: experts have been characterized as being ‘merely skilled’ versus ‘highly competent’ or more colorfully as ‘artisans’ versus ‘virtuosos.’ These differences apparently exist across a wide range of jobs (p. 45).

Adaptive expertise is the foundation of an applied education curriculum. Being adaptive is critical to survival in any economic sector. But experts who have been alienated from their economic sector due to market conditions MUST adapt to new opportunities if they hope to survive. The inability of U.S. steel workers in the 1970s to adapt to new economic sectors after the loss of the U.S. steel industry due to competition from Asia was catastrophic to the affected individuals and their families. Our economic history is riddled with similar cases. This is the way economics plays out in any industrialized nation. When citizens are ill prepared for such eventualities, they turn to government to erect protectionist barriers to save them from ruin, but at the expense of all others. If everyone were prepared to adapt to new conditions, the loss of economic sectors would not be a problem, or at least less of a problem.

Beliefs about what it means to be an expert can affect the degree to which people explicitly search for what they don't know and take steps to improve the situation. In a study of researchers and veteran teachers, a common assumption was that 'an expert is someone who knows all the answers.' This assumption had been implicit rather than explicit and had never been questioned and discussed. But when the researchers and teachers discussed this concept, they discovered that it placed severe constraints on new learning because the tendency was to worry about looking competent rather than publicly acknowledging the need for help in certain areas (see Dweck, 1989, for similar findings with students). The researchers and the teachers found it useful to replace their previous model of "answer-filled experts" with the model of "accomplished novices." Accomplished novices are skilled in many areas and proud of their accomplishments, but they realize that what they know is minuscule compared to all that is potentially knowable. This model helps free people to continue to learn even though they may have spent 10 to 20 years as an "expert" in their field (p. 48).

Curricula that emphasize breadth of knowledge may prevent effective organization of knowledge because there is not enough time to learn anything in depth. Instruction that enables students to see models, of how experts organize and solve problems may be helpful. However, as discussed in more detail in later chapters, the level of complexity of the models must be tailored to the learners' current levels of knowledge and skills.

While experts possess a vast repertoire of knowledge, only a subset of it is relevant to any particular problem. Experts do not conduct an exhaustive search of everything they know; this would overwhelm their working memory. Instead, information that is relevant to a task tends to be selectively retrieved.

The issue of retrieving relevant information provides clues about the nature of usable knowledge. Knowledge must be 'conditionalized' [*related to an application*] in order to be retrieved when it is needed; otherwise, it remains inert. [*This is why principles must be seen as a priority of education, with facts and data simply assisting in teaching principles.*] Many designs for curriculum instruction and assessment practices fail to emphasize the importance of conditionalized knowledge. For example, texts often present facts and formulas with little attention to helping students learn the conditions under which they are most useful. Many assessments measure only propositional (factual) knowledge and never ask whether students know when, where, and why to use that knowledge.

Another important characteristic of expertise is the ability to retrieve relevant knowledge in a manner that is relatively "effortless." This fluent retrieval does not mean that experts always accomplish tasks in less time than novices; often they take more time in order to fully understand a problem. [*This contradicts the belief that speed of answering questions for tests is important and that it measures intelligence. This points out how dangerous assessment tests can be since they*

will marginalize those who may be thorough but not fast at what they do.] But their ability to retrieve information effortlessly is extremely important because fluency places fewer demands on conscious attention, which is limited in capacity. Effortful retrieval by contrast, places many demands on a learner's attention: attentional effort is being expended on remembering instead of learning. Instruction that focuses solely on accuracy does not necessarily help students develop fluency (p. 49).

We should analyze what encompasses expert knowledge versus general knowledge in order to better understand what education is supposed to achieve. The end of education is to achieve expertise by individuals at some point in their educational experience. The goal is not to make experts out of students in every subject or discipline. By understanding what encompasses expertise, we have a better handle on helping people become experts in their chosen field rather than wasting time on teaching information they will never use. Laying a strong foundation for individuals so they can adapt is important to these ends. Our current system lays a foundation for more education rather than for expertise in a chosen field. Or to take it one step further, public education prepares individuals for a career in academia more than anything else.

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