

Advancing educational diversity: antifragility, standardization, democracy, and a multitude of education options

Michael W. P. Fortunato¹

Received: 1 October 2015 / Accepted: 31 October 2015 / Published online: 28 December 2016
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Abstract This essay is a response to a paper by Avery and Hains that raises questions about the often unintended effects of knowledge standardization in an educational setting. While many K-12 schools are implementing common core standards, and many institutions of higher education are implementing their own standardized educational practices, the question is raised about what is lost in this effort to ensure regularity and consistency in educational outcomes. One such casualty may be local knowledge, which in a rural context includes ancestral knowledge about land, society, and cultural meaning. This essay explores whether or not efforts to standardize crowd out such knowledge, and decrease the diversity of knowledge within our society's complex ecosystem—thus making the ecosystem weaker. Using antifragility as a useful idea for examining system complexity, the essay considers the impact of standardization on innovation, democracy, and the valuation of some forms of knowledge (and its bearers) above others.

Keywords Rural education · Standardization · Antifragility · Diversity · Democracy

Lead Editors: L. Avery and D. Long.

This paper is part of the special issue Cultural Studies of Rural Science Education.

This review essay addresses issues raised in Leanne Avery's and Bryan Hains' paper entitled: *Oral traditions: A contextual framework for complex science concepts*. doi:10.1007/s11422-016-9761-5.

✉ Michael W. P. Fortunato
fortunato@shsu.edu

¹ Department of Sociology, Center for Rural Studies, Sam Houston State University, Box 2446, Huntsville, TX 77341-2446, USA

Please read the following words and respond with the first thing that comes to mind: Alternative Higher Education. Try to envision what an alternative higher education might look like, feel like, smell like, sound like. Who is teaching? Who is learning? How are interactions taking place? What sorts of things are being taught, and who decides on the curriculum? What sorts of skills will these alternative students emerge with? Or my favorite: What is *valued* in alternative education?

I have been conducting this thought experiment with a few of my friends and colleagues over the course of the past several months. Usually, I just slip it nonchalantly into a discussion about something unrelated to conjure a more visceral reaction. I have not been conducting scientific trials, nor are these intended to come off as reproducible results, but within thirty seconds of muttering the words “alternative higher education,” the word “online” nearly always emerges from my conversation partner. “MOOC” is another popular utterance, as well as “what do you mean, *alternative*?” Online education, MOOCs, and the rise of for-profit universities are without any doubt alternative to going to class on a campus for 4 years, sitting in a classroom, taking exams and writing papers, reading the occasional tome now and again on a topic that interests you deeply. The movement of higher education from the physical classroom to the virtual one is a natural progression in a world that increasingly relies on flexible work schedules, people holding down multiple jobs, serving in the military, raising a traditional or non-traditional family, and dealing with the myriad pressures of modern life. Where many of these individuals may have been shut out of an education before, suddenly there is genuine, viable promise in the form of a system of higher education that works around the student’s schedule. In the developed West, a culture that increasingly demands higher education credentials, degrees earned from institutions that were virtually unknown a decade ago have incrementally gained legitimacy and now represent a gleaming beacon of hope for legions of ambitious professionals, yearning to further their minds, intellect, and earning potential. Some scholars shun this movement—good or bad, I find it fascinating.

Over the past several months, I have been thinking about alternative higher education specifically, mostly because “traditional” higher education seems to be getting a bad rap lately. By traditional higher education, I mean spending tuition to attend a 4-year university in-residence. You are familiar with the drill: Stay in a dorm or apartment, work a job or two in the service sector, study during the week, party on the weekends, make some of your best friends for life cramming for finals together over coffee and pizza.

There is something fundamentally appealing about college culture in America, especially among those of us who remember these experiences as the very best of our lives. Increasingly, the dreams of a campus lifestyle are coming at an incredible cost to students everywhere, often leaving them in a vulnerable position. First, there is the sheer cost of an education. Only about 20 % of college students can afford to go to school without incurring debt, with the average 4-year bachelors student taking out about \$26,600 in debt, and total national student debt topping \$1.2 trillion overall (Denhart 2013). This creates mammoth economic spillover effects in terms of the ability of young professionals to save and invest. The problem is even more dire for minority and low-income students, whose chances of attending a 4-year college are more likely to be dependent on scholarship funds that are becoming more scarce in the face of budget cuts (Washington and Salmon 2014). It would all be worth it given the high quality of education in the United States, except this quality somehow appears to be faltering as well. Recent studies argue that the fruits of a college education may be paying off in paper, but not in terms of skills. New studies from Gallup (Lopez 2012) and Harris Interactive (Zimmer 2014) illustrate that the public largely feels that college graduates are unprepared for the world of work (Lopez 2012), and while

students rate their own workplace expertise highly, their corresponding hiring managers feel they have a very long way to go (Zimmer 2014). In a shocking recent book, Richard Arum and Josipa Roksa (2011) found that about 45 % of students from twenty-four institutions made no meaningful gains in knowledge in the areas of critical thinking, complex reasoning, and writing.

Turning back to the thought experiment on the first page of this essay, what did *you* think of when I mentioned “alternative higher education?” In that first, fleeting moment, what did your mind turn to? Was it a system of online education? If so, that is perfectly understandable! It is also precisely the issue I hope to raise in this commentary—that the term “alternative higher education,” and “alternative education” more generally from Kindergarten through college, have become too closely associated with only a few alternatives to traditional education. This tendency persists when *so many* other alternatives are out there if we continue to use our imaginations and intuition. I believe that this is the point made in the preceding article by Avery and Hains: that our mainstream sense of “knowing” is unduly influenced by urban thinking to meet the demands and challenges of a rapidly urbanizing world. However, this often eschews knowledge that has served us for centuries in favor of other forms of knowledge that are perhaps more useful for the modern world, and certainly easier to measure. The standardization of education is intended to address major educational gaps in basic literacy, science, and math—all important skills for a viable career or continued education in the modern age. It happens in universities (think “an increasing barrage of teacher evaluations”) and in the public school system (think of “Common Core” standards, which I will evaluate shortly). Such strategies are often intended to raise the bottom end, ensuring that all students, regardless of background or class, have access to a solid, basic education that functions effectively in the societies where they are most likely to live (Bleiberg and West 2014). At the university level, evaluations can play a democratizing role by giving students a voice in rating the quality of their education. At any level of instruction, I can hardly think of a more noble goal than to endow each child or young adult with the gift of an excellent education that they themselves can appreciate and enjoy, no matter what their background or how much money runs in their family.

The literature, science, and math that are the subject of standardized testing are not unidimensional and linear ideas. All continue to be robust areas of discussion and debate, enhanced through the questioning of existing knowledge, and debates about the ontologies and epistemologies of life’s great questions. And, like any area of knowledge, there are often heterodoxies playing out quite naturally in human society by people who either consciously or unconsciously have found a way to do things differently that suits them quite well. As I write this, there are entire functioning societies living their lives based on worldviews that are vastly different than those espoused by most modern Western educational systems. Avery and Hains adroitly argue that there is more than one way to approach science, for example, and both modern and ancestral ways of knowing about science work just as well for some individuals. After all, we live in the same world that our ancestors inhabited, and that physical world has changed little, even if human society has changed very much. While new skills are inevitably necessary to advance modern society, a unidimensional approach to modern skill building also raises concerns about what happens to individuals who may abide by more traditional values, or who may see innovation, novelty, and especially *progress* by a different set of metrics than those found in the popular discourse. This value difference can lead to some tension about the best way to educate youth, but I argue that it also introduces some beneficial instability into the system, helping the entire system to become increasingly *antifragile* over time, and thus more able

to cope with systemic shocks because a greater diversity of knowledge is uplifted within the system—knowledge that can come in handy in times of both crisis and opportunity.

Let us begin with a quick briefing on the antifragility concept and why it matters to advancing educational diversity. Antifragility was introduced by Nassim Nicholas Taleb in a book by the same name (2012) meaning “the opposite of that which is fragile.” Something that is fragile breaks easily at the first sign of distress, like a dinner plate falling from a table. Taleb argues in his characteristically disputatious fashion that antifragility is commonly misunderstood even by experienced scholars and thinkers. While many individuals interpret antifragility to mean “that which is unharmed by abuse,” Taleb argues that this is not correct—these people are describing *robustness* or *resilience*. Robustness and resilience are not bad, as any one of us should be so lucky as to escape from a major disaster unscathed, hair still neatly coiffed and pocket square only the smallest bit ruffled. However, robustness and resilience are fundamentally neutral descriptors representing indifference or immunity to distress. To be truly *antifragile*, Taleb argues, we must describe a category of things, people, or phenomena that actually *improve* with abuse, disorder, stress, and distress. Chaos is disastrous for all that is fragile, but essential and beneficial for all that is antifragile. If this has left you scratching your head, then it is no wonder that so many thinkers have confounded antifragility with “robustness” or “resilience,” which seem to make a lot more sense. After all, what truly benefits from chaos and harm?

While antifragility appears superficially to be less intuitive, Taleb (2012) carefully argues that a great many things—including some of the most fundamental processes in the universe—are in fact deeply antifragile. In the long run, forests benefit from forest fires, which give portions of the forest an opportunity to regenerate and rid themselves of old brush and chronic pests. The human body is highly antifragile, as stress on the body is necessary to build everything from strong muscles to cardiovascular health to improved immune function. Catching a cold or getting a vaccine are both highly antifragile situations, as the immune system seizes upon pathogens to generate new antibodies for the future. I would personally argue that a great many social processes, like democracy, are antifragile, as some of the most fruitful outcomes for free societies arise from conflict, debate, and the airing of grievances. I would further argue that this is especially true in the local case more than in the national case, as each citizen enjoys a greater share of the public voice, along with greater possibility for participating in ways that directly impact local decision making. Even innovation, whose basis in Schumpeterian thinking is an inherently disruptive and disequilibrating process, benefits from marketplace disorder and inefficiency while older, more fragile markets become obsolete by the same disorder and inefficiency (see Schumpeter 1934). If any part of you believes in the maxim, “what does not kill you can only make you stronger,” or “a pound of dirt is good for you,” then you viscerally understand antifragility. And, while maxims are often the stuff of old wives’ tales and parent-teenager lectures, Taleb vociferously claims that antifragility is not.

If some of the most fundamental processes governing the human body, organic democracies, complex ecosystems, business, markets, culture, and social discourse are all antifragile, then what (besides a dinner plate) can be considered fragile? In Taleb’s opinion, the most fragile human construct is a large institution. Given their diversity, it is hard to stereotype institutions, but Taleb generally characterizes institutions as being rule-bound structures that, borrowing from A. Alan Schmid (2008), structure and order human action, roles, and expectations. While this often serves a beneficial purpose (liberating individuals from excessive doses of disorder that could disproportionately harm some), the structure of a great many institutions is inherently fragile. Institutions are generally

designed to serve the *average* member, and rules are created that constrain behavior to an accepted set of norms. These institutional rules may be semi-flexible over time—but they generally are not, with new rules being created atop a bedrock of old rules. Ultimately, while rules are created that serve ancestral values of the institution, and constrain and reward behavior around *established* norms, institutions have enormous stability in the short term. However, they are extremely prone to *black swan* events—events that are extremely rare but extraordinarily severe in their effects. They also often constrain the ability of members to innovate, which may partially explain why so many paradigmatic entrepreneurs have dropped out of institutions of higher education, or left their comfortable day job in an established company to build a new one. Institutions are very good at planning for mundane, day-to-day variation, but they do a poor job at planning for the rare and extreme—whether good or bad (Taleb 2012).

In America, we have seen such shortcomings in situations ranging from the failure of the federal government to respond adequately to Hurricane Katrina victims over the course of an entire decade, the failure to foresee and react adequately to the September 11 terrorist attacks in New York, or the housing bubble of the late 2000's, or to anticipate the rise of social and online media over the past decade as a viable alternative media source. None of these events were predicted even a few months before they occurred, but all exposed weaknesses in existing public and private institutions. Whether good or bad, it is often black swan events that have a greater impact on society and social action (and especially social *change*) than the more highly standardized, day-to-day action of institutions. These sudden changes expose the *fragility* of legacy systems for better or worse, either by revealing critical flaws in legacy systems and their inability to cope with the unexpected; or by making old systems, products, and services obsolete in favor of new ones (Schumpeter 1934). While many institutions have been able to survive for hundreds of years, I would argue that these institutions contain antifragile components that enable portions of the institution to spontaneously reinvent themselves—perhaps just not at the vanguard position.

A fair and timely point would therefore be, “Why does antifragility matter anyway? Just look at all the major institutions out there and the good they have done for society! A good education could train students for important jobs in these kinds of institutions.” Indeed, this is hard to dispute. It is difficult to argue that long-standing institutions like century-old corporations, governments, societies, and nonprofits have all succumbed to black swan events, therefore they must obviously be doing something right. However, this line of argument misses an important point. Many larger institutions have stayed fresh by incorporating the innovations of smaller, more maneuverable players in their field—an internalization of the “product life cycle,” and a nod to Schumpeter’s acquiescence that even that which is truly innovative is built from the recombination of existing knowledge (Schumpeter 1934). However, does this mean we should be training students to excel at what is *established*, or what is *absent from the establishment*, perhaps in the form of new ideas and intellectual frontiers recombined from a variety of sources?

My own greatest fear is that, in a standardized environment, true brilliance could potentially be mistaken for socially deviant behavior, or just a plain vanilla wrong answer. The mistake would then be corrected, according to standard procedures, and the student informed—encouragingly—that they should modify their thinking to standard practice. Teachers could feel confident that their method is working, as the student will begin to excel at the preordained metrics for determining success. The administration could likewise note improvements in established metrics as this student, and others, make rapid progress toward the expectations of an exemplary graduate: a college student at a good

school and/or career professional in a respectable field. The student may begin to feel shame for drifting from the establishment, or rebel, or engage in a variety of repressive coping behaviors to deal with the cognitive dissonance between their version of truth and that of their educators. The real loss belongs to society, as potentially brilliant ideas are softly stifled in favor of the less risky.

Taleb goes into much, much more detail and nuance than I wish to examine here supporting his antifragility hypothesis, including the ways that modern institutions push the consequences of risk down to low-level employees (while retaining most of the benefits at the top), to the fragility of modern medicine and its incentives to solve emergent problems rather than promote ongoing health. If this kind of thing interests you, then—without intending to sound like a book reviewer—*Antifragile* (2012) is worth a read. While Taleb paints with a very broad brush, there are specific ways we can meaningfully connect antifragility to modern education. For example, it can be intuitively argued that antifragile behavior is unlikely to come from institutions espousing fragile practices, such as valuing conformity, or the assumption that empirically-driven scientific relationships apply homogeneously to groups that are, in fact, quite heterogeneous. Therefore, if modern education is increasingly bound by institutional standards and the standardization of norms as a means of rewarding and constraining faculty and teacher behavior (and student learning), what is the likelihood that students would learn to be antifragile in an environment that rewards and uplifts the routine attainment of established goals, albeit with excellence?

Standards in education are often met with harsh resistance from critics as a punitive form of externally-imposed educational control, like the standardized exams of days past, although this is not completely accurate. While it focuses on primary and secondary education, let us take Common Core as an example of such standards. One of the true benefits of Common Core, for example, is the promotion of standard metrics for achievement (established ends), while encouraging innovation in the methods used to achieve excellence across those metrics (flexible means). The argument, as posited by Joshua Bleiberg and Darrell West (2014) is one between right and left, with liberals fearing Common Core's potential to punish educators, and conservatives concerned about authoritarian overreach of the government into the realm of education. This may be plausible given the divisive state of political affairs in the United States, but I believe it misses the point entirely. To me (and Avery and Hains, I believe), the problem with Common Core and other attempts to standardize K-12 and higher education can be found buried in Bleiberg and West's (2014) defense of the program:

The main intent of standards in education is to ensure a baseline level of instruction quality. Another motive behind education standards is to minimize variation in learning goals across classrooms, schools, and districts... The designers of standards intend to establish an architecture to assess educational outcomes that provides information to teachers, policy makers, and parents. (p. 6)

The authors continue by comparing educational standards to the national telephone system, borrowing from economics to emphasize the switching costs of moving across diverse networks utilizing different formats (Bleiberg and West 2014). For die-hard computer users moving from PC to Mac and vice versa, this is a familiar problem. The authors also stress Common Core's improved ability to allow innovators to take calculated risks within the framework (Bleiberg and West 2014). However, this line of arguing not only appears to be contradictory, it underscores an important hidden fragility of Common Core and similar educational standards systems. The emphasis of Common Core is to

“minimize variation” to ensure seamless exchange of knowledge across classrooms, schools, and districts. Such minimization of variation is the essential goal of institutions according to Taleb (2012), who argues in Darwinian fashion that diversity is essential for any complex ecosystem to thrive and evolve. It also uncovers a dangerous reality about the standardization of education: While the “means” of education remain flexible under educational standards, the “ends” do not. In other words, the rules of the classroom may be up to the teacher or professor, but the rules for making rules are not. Such a system may encourage students and teachers to think broadly and innovate, but only within an accepted and externally-driven set of standards.

I believe this reveals the silent problem beleaguering Common Core: It is not about the standards, it is about who is setting the standards, and why their standards are the ones every school should adhere to. Bleiberg and West (2014) refer to the “designers of standards,” but who are these individuals, and why should they be trusted with something as precious as an education? On the Common Core’s website, the designers of Common Core include “teachers, parents, school administrators, and experts from across the country, together with state leaders (Common Core State Standards Initiative 2015),” although no additional detail is given as to who these individuals are, or what type of expertise the experts bring to the table. The initiative appears, at least superficially, to be democratic and well-intentioned, but the lack of detail about *who* is creating the standards under which their children will be educated should raise some natural discomfort for the average citizen.

Perhaps it is not useful to frame this debate around educational standards being “right or wrong,” “good or bad.” Indeed, some students may benefit greatly from a more structured environment, and proponents of educational standards are indeed doing their best to overcome the shortcomings of modern education in America. Rather, the debate is more a question of democratic ethic: the idea that all citizens must adhere to the same standards—standards that they themselves did not have a voice in creating. These standards purport to make students “college or career ready” (Long 2013), but for what kinds of careers? Can we predict now what skills will constitute “readiness” in the long-term, especially in a socioeconomic environment that values novelty, innovation, and quite frankly, anti-fragility? This is the wrong question. It is not *can* we predict what students need to thrive, but *who* predicts what students need to thrive, and *what* do those individuals uphold as valuable. While standardized learning may streamline outcomes, and standardized testing encourages adherence to those outcomes, any system empowering a small team of advisers to predict what is valuable in education can quickly crowd out alternative perspectives. At worst, such a system sends a disheartening message that the average teacher or professor should encourage learning, but should not be trusted with setting appropriate goals—that’s for the experts. While online debates about Common Core have appeared to superficially circle around how people do math, leaving many parents scratching their heads, I believe the real, felt tension being aired online is not about math—it is about being told by strangers claiming to be experts that your way of doing things is no longer valued as a standard.

Imagine how some people in rural areas feel when experts tell them that some of their traditional, long-standing folkways are no longer valid as teaching tools for youth. Now *there* is a good reason (more than math) for a public discourse!

American history is rife with stories of bold individuals who were deemed misfits in a standardized environment, only to emerge into the real world and become magnificent successes at a variety of creative and innovative endeavors. Even the birth of the United States was grounded in the will of a small collective to deviate from established norms, even at great cost to their own security, in order to stay true to their own convictions of

how a people should be governed fairly. What about innovators of the Schumpeterian variety whose ideas transcend incremental advancements within the current system, and instead envision whole new systems empowering more people with fewer resources, more often? Elevating a diversity of thinkers with diverse intellectual backgrounds is increasingly viewed by scholars as a key to overcoming path dependence, and breaking down old institutional constraints in favor of new ones is critical to overcoming institutional lock-in—the stifling of new ideas beyond the realm of current institutional constructions (see Liebowitz and Margolis 1995; Fortunato et al. 2014; Foxon 2002).

Is it any wonder, then, why the idea of the standardization of something as formative as a young person's education might be culturally viewed with contempt or suspicion in a society whose great heroes deviated from the norm at great cost to themselves in order to build something better? What happens to those brilliant rebels who dare to challenge the meta-framework, who espouse alternative goals to those established by a panel of experts? Are these individuals destined to conform, or be declared misfits and failures of the system? The American narrative of innovation and strength in the face of tyranny (i.e., one path forward driven from an external authority), while fetishized in American society, appears to be cast asunder by the logic of standardization. Educational standards give the illusion of great freedom and flexibility in designing innovative approaches to meet goals, preparing students for the world's challenges. Rather than creating space for different ways of knowing and different kinds of intelligence, excessive reliance on standardization creates a social stigma by producing fertile ground for exclusion of those who may pursue different goals or learn in different ways. This is a much deeper issue than whether or not a child can read, or whether a high schooler understands photosynthesis and respiration, or whether a college student knows what an integral is and how it is applied. While we impose standards to bring up the bottom end—again, a noble goal—we also isolate and eschew those productive rebels who might simply see the world differently, question the current paradigm, and create situations that are, let's face it, very hard to measure indeed. Tragically, educational standards that elevate one set of goals across too broad a population may improve student learning while also exposing them to the fragility of the current, expert-designed system. There exists a cognitive dissonance between the wild, disruptive innovation valued in business and technology magazines, and a system that appears to commoditize students, ensuring a sort of quality control for new entrants into the workforce. Such an approach only underestimates the wondrous diversity of youthful intellect and human imagination. It also fails to address the deep depersonalization of education toward outcomes, and the outsourcing of educational decisions to experts who are appointed rather than elected.

An influential mentor and close friend, Ted Alter, would often say in his lectures, “There is power in the rules, but the real power lies in who makes the rules for making rules.” These are the meta-rules, the constitutional architecture, the stuff that educational standards are made of. When values are inculcated at a meta-level, they can not only constrain what can occur within the system, they can also constrain what is considered possible, desirable, and deemed respectable. It may be a throwback to Peter Berger and Thomas Luckmann (1966), but standards can, in very meaningful ways, construct a reality for students that is highly homogeneous in terms of basic values, and limit the realm of the possible. 99 percent of the time, this may lead to more harmonious outcomes in terms of shared understanding of the world. However, in the face of inevitable black swan events, will our population contain the intellectual, physical, and critical thinking capabilities to see beyond institutional constraints that may be so subtle as to go virtually unnoticed in conscious reality? Like the monoculturing of plants leading to widespread susceptibility of

certain pathogens, will our monoculturing of educational values create long-term fragility to rare but extreme events, or rare but extraordinary opportunities to pursue beneficial social innovations and change?

Alter recently contributed to a book about democracy in higher education (Peters 2010), the underlying premise of which is that democracy, and the process of fleshing out diverse viewpoints in a way that fully accounts for human emotion and passion, is central to building a more democratic society. Discourse is not a well-argued set of points, but rather a set of skills that facilitates meaningful discussion and the direct engagement of sometimes contradictory ideas. Deliberative democracy is less about who prevails and more about building understanding, so that individuals can pursue diverse (*key word!*) life pathways while respecting and acting accordingly toward the well-intentioned actions of others. In fact, the crafting of meta-level goals and flexible systems-level design is itself an extraordinary skill requiring meta-level thinking: a level of thought requiring the thinker to place themselves in the shoes of many other individuals with many perspectives in order to understand how their actions may impact an extraordinary diversity of ideological others.

How do we open up the power and capacity for more holistic and integrative thinking? One way is to continue to push frontiers in terms of co-educating students from across a diversity of backgrounds. Another is to open up a diversity of highly creative ways to learn, which brings us to the original question in this paper. If standards were not an issue, and if educators felt empowered to set their own “standards” for learning, what would alternatives to the common system look like? My thinking is that, while “online education” indeed represents one educational method for overcoming the constraints of time and space, it is only one alternative. I challenge each reader to imagine the skill set of a student who learns across multiple environments, and is able to adapt—even thrive—on learning what it takes to succeed in new situations quickly, and often with new classmates. Students may spend some time in the traditional classroom learning fundamentals of a subject matter. Beyond, imagine if higher education programs also incorporated applied learning in the community, apprenticeships and more internships, online learning components with an emphasis on co-creating knowledge across distant cultures, spending time in nature, spending time in the city, observing, questioning, reflecting, or as Taleb (2012) suggests, reading lots and lots of books. Perhaps everyone could benefit from taking a class in a giant lecture hall with a captivating professor at the helm, then one with a small group held outside, then one that is based mostly on project work, one that is a creative studio, one where students must design their own curriculum, one online with colleagues from four continents, and some one-on-one learning with an established master of their trade. It is a smattering of the universe, and what more fitting place for it than at a *university*.

Bringing the focus back to rural schools and rural education prior to the university, widening the gaze of what constitutes education may also have profound and lasting effects on rural students within the broader society. Instead of being constrained by one dominant view of science—or society or life for that matter—rural students can confidently learn multiple ways of looking at the same problems and phenomena, seeing each as useful in different situations rather than one being “the correct standard.” It is, of course, useful to look at phrases like “red sky in the morning, sailor’s warning” and understand that this is really due to light scattering from an approaching storm front. The scientific definition is precise, replicable, and transcendent to one place or one situation. Rural students can of course harness this powerful knowledge through their coursework. However, understanding how local knowledge operates on the ground not only gives rural students the opportunity to become bridge builders between the worlds of expert and local knowledge, but to also seek legitimate wisdom and insight from folk pathways that have served some

rural populations for centuries. Taleb (2012) himself challenges the Socratic idea that the beginning of wisdom is the definition of terms. For example, just as a child can adroitly ride a bicycle without understanding angular momentum and centripetal force does not mean (s)he does not possess wisdom about the bicycle. In fact, a skilled child may be an excellent bike rider, while the physicist may be downright clumsy on two wheels.

In this way, a truly antifragile classroom in rural schools would equally privilege many types of understanding as forms of mastery, from practical heuristics nested deep in local folklore, to the theoretical expansiveness of hundreds of years of scientific advances. The antifragility does not come from this equal privileging, but rather its outcome as it manifests in a young person's mind: the ability to draw on multiple knowledge sets across many situations as they become useful, rather than the implied necessity of seeing the world through one lens over others that are equally useful. Students, likewise, can feel confident that their penchant for seeing the world differently is not deviant, but may be the key to unlocking vast amounts of knowledge and wisdom beyond the scientific. Rural students, in particular, are just as empowered to draw from their traditional fund of knowledge as they are from their scientific imagination, perhaps even blending the two in novel ways. Programmatically, this could lead to classroom exercises asking students to integrate scientific knowledge with a more traditional, locally relevant understanding of the world. This democratizes knowledge by allowing the perspectives of rural people—including the voices of minorities and indigenous peoples—to be viewed as equally legitimate and useful as those in science texts. The more pathways there are to knowledge, the more equipped rural students will be to find culturally relevant outcomes not only to problems of science, but of society, too.

The *alternative* in *alternative education* may therefore be that simple: Encouraging alternative pathways to knowledge without excessively privileging one over the others. I have heard professors speak of students learning to “game” the system by finding loopholes in class policies. As long as hard work is part of the equation, perhaps students are trying to master what it takes to succeed in the system, and it is our duty as educators to give them lots and lots of different systems to master, much like the real world. I do not believe that such an ecosystem of learning, despite its beneficial outcomes, could easily have any set of standards applied to it, nor would it produce a truly consistent set of marketable skills. What it would do is move beyond a focus on skills and outcomes, and instead build aptitude in adaptable, team-oriented creative processes, building broadly-applicable tacit and codified knowledge across a wide range of circumstances—regardless of the subject area. Instead of teaching subject matter, such an approach requires professors to empower students to work together to create their own meta-frameworks—their own rules for making rules—along with the professor. Subjects then take their natural place as specific applications of creative inquiry, and useful lenses for seeing the world in new ways. Furthermore, this approach would not squeeze out more traditional ways of learning and knowing, and would instead give a wider range of individuals exposure to heterodox ideas and allow those students who resonate with those ideas to spend more time there, while still gaining exposure to yet other ways of thinking. It may be unpopular and risky to shun a focus on standards as though we, as a society, should not hold our students to measurable outcomes. Perhaps the greater risk that we are missing as a society is what happens when students are held to someone else's standards rather than their own, which run the risk of being far loftier, more ambitious, and more wildly imaginative than anything an expert panel can create.

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Michael W. P. Fortunato is an Assistant Professor of Sociology, Engaged Scholar, and Director of the Center for Rural Studies at Sam Houston State University. His research focuses on how local culture and institutional structure shape local innovation, entrepreneurship, and well-being in communities both domestically and internationally; and how to enable transformation from legacy social systems into newer, flexible, more democratic local institutions that serve the public good. Fortunato aims to use this knowledge to work with communities to co-create local systems and practices for overcoming obstacles, elevating citizen voices, and unleashing untapped creative potential.