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The Faulty Foundation of American Colleges

By Todd Rose and Ogi Ogas | JANUARY 17, 2016

"It is not a dream of motor cars and high wages merely, but a dream of social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position."

—James Truslow Adams, coining the phrase "The American Dream" in his 1931 book *The Epic of America*



Ken Harris

In the early 1950s, at the dawn of jet-powered flight, the U.S. Air Force confronted a troubling problem: Its pilots could not keep control of their planes. The two official designations for the mishaps were incidents and accidents, ranging from bungled landings to aircraft-obliterating fatalities. At the worst point, 17 pilots crashed in a single day. The military initially pinned the blame on the men in the cockpits, citing "pilot error" in crash reports. To remedy this, the Air Force elevated its recruiting standards and changed up its flight school — to little effect. The pilots, meanwhile, vehemently denied responsibility, insisting something was not quite right with the aircraft. Yet when engineers tested the planes' mechanics and electronics, everything worked as designed.

So what was causing the mysterious performance failures? The pilots had got it right. The problem lay in the design of the cockpit. The military had such a difficult time identifying the problem — and its doctrine-shattering solution — because it went against everything they thought they knew about designing for pilots.

In 1926, Army scientists had measured the size of hundreds of male pilots (the possibility of female pilots was never a serious consideration) and used the data to standardize all cockpits and controls to fit an average-size airman. The assumption was that this would maximize the pool of pilot talent while minimizing the costs of manufacturing. That standardized-design dogma went unchallenged for the next three decades. But in 1950 a junior researcher named Lt. Gilbert Daniels finally asked, How many pilots really were average?

Using body measurements for 4,063 airmen, Daniels calculated the average of the 10 physical dimensions believed to be most relevant for cockpit design, including leg length and wrist circumference. They formed the dimensions of the "average pilot," which Daniels generously defined as someone whose measurements lay within the middle 30 percent of values. Next he compared each individual pilot,

one by one, with that average pilot. Before Daniels crunched his numbers, the consensus in the Air Force was that a sizable number of pilots, perhaps a majority, would be within the average range on all 10 dimensions. That's why he was stunned when he tabulated the actual number: zero.

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Out of 4,063 pilots, not a single airman fit within the average range on all dimensions. One might have longer-than-average arms, but shorter-than-average legs. Another might have a big chest but small hips. Even more astonishing, Daniels discovered that even if you picked just three dimensions — height, chest circumference, and sleeve length — less than 4 percent of pilots were average on all three. A cockpit standardized to fit the average actually fits no one. Forcing individuals to conform to a standardized cockpit ensures that nobody will ever perform at his (or her!) full potential.

The Air Force responded to Daniels's findings by abandoning its calcified design philosophy. Henceforth flight systems would no longer be standardized to fit one type of person; instead, they would be designed with the flexibility to fit any individual. After that radical new policy was adopted, accidents and incidents waned, and pilot performance soared.

There is another American institution that compels individuals to fit into a standardized cockpit and penalizes them when they fail to perform at the expected level: higher education. The architecture of our contemporary system of higher education was designed around a misguided set of assumptions about the individuality of students, assumptions that over time have become so fossilized that they are rarely acknowledged, let alone challenged. And just as with the Air Force's initial attempts to solve its problems, many of the proposed fixes for our institutions' deficiencies (including runaway tuition, poor completion rates, the mismatch between graduates' skills and employers' needs, and educational inequity) are also doomed to fail if we do not correct the profound design flaw at the very heart of higher education. If we want to solve our own seemingly intractable problems — if we want to offer a deep and genuine form of equal educational opportunity — then we must switch our organizing philosophy from standardization to individuality.

This is not a new debate. In fact, this century-old clash of foundational assumptions might be regarded as the cardinal battle for the soul of modern education. On the side of education for individuality we find some of the most admired and progressive names in American education, including John Dewey, Charles Eliot, and Benjamin Bloom. Those Individualists were animated by their defining assumption that every student is different and that education should be designed to accommodate those differences. Dewey railed against the relentless forces of standardization in the 1920s, proclaiming, "It is safe to say that the most limited member of the populace has potentialities

which do not now reveal themselves and which will not reveal themselves till we convert education by and for mediocrity into an education by and for individuality." The Individualists distilled their core assumption into a compelling moral argument: We have an obligation to help all students become the best they can be, according to each one's unique constitution of abilities and interests.

Yet by the 1940s the Individualists had lost, and lost unequivocally. They had been steamrolled by the Standardizers, who possessed two decisive advantages that the Individualists lacked: a coherent science supporting their assumptions about students, and practical, effective methods for designing an education around those assumptions.

The means — and mind-set — for establishing a standardized education were provided by Frederick Taylor, the Quaker industrialist whose principles of "scientific management" transmogrified American industry and education in the early 20th century. Taylorism mandated the standardization of all organizational processes around the average employee (or average student) in order to produce a standardized product. Crucially, this design philosophy held that every individual must conform to the needs of the system, a doctrine that rejected the central tenet of the Individualists. "In the past the man has been first," pronounced Taylor in 1911, "in the future the system must be first."

Educational Taylorists ordained the diploma as the standardized product of American higher education and established standardized educational processes for attaining it. Undergraduate degrees are still typically awarded based on the completion of a fixed set of required courses over a fixed number of semesters, each course lasting a fixed number of hours and each taught at a fixed pace. Within our Taylorized system, a bachelor of arts in civil engineering is designed to be equivalent to a bachelor of arts in English literature, each degree held to

represent an equal unit of learning independent of who a graduate is or which college she graduated from.

This uniformity was intended to ensure that the brain of every student who earned a diploma had attained the same level of "critical thinking," "civic awareness," "cultural literacy," or some other normative set of skills or knowledge. Even though educators have never stopped debating what, precisely, our standardized educational product is supposed to have inculcated in the brains of graduates, our educational processes were explicitly assembled to ensure that every student's brain had submitted to a consistent learning experience.

In order to sensibly and fairly apportion limited educational resources, the Standardizers sought to efficiently sort students by ability, a goal they accomplished by adopting the methods and mind-set of the British mathematician Francis Galton. Galton believed that statistics demonstrated that a person's level of talent held constant across all intellectual, physical, and moral domains. "The youths who became judges, bishops, statesman, and leaders of progress in England could have furnished formidable athletic teams in their times," vowed Galton in 1909. He concluded that it was society's duty to accurately measure each person's relative superiority or inferiority in order to appoint people to their proper stations in life. To help accomplish that task, Galton developed a one-dimensional metric of rank that summarized an individual's overall level of ability and potential.

Galton's notion of a single-score ranking provided the perfect basis for sorting students within a Taylorized system of education. Since each diploma was designed to represent an equivalent macro-unit of learning achieved by each graduate's brain, it seemed logical to rank students according to how well they

performed during each standardized course they took while earning a diploma and then combine those course rankings into a single ranking, grade-point average, that represented a student's overall level of talent.

Today, even though most educators would probably agree that superior chemists do not necessarily make superior poets nor superior psychologists, we all inhabit a seamless and implacable world of Galtonian rank. A high-school student's one-dimensional ranks (high-school GPA, test scores) are used to determine undergraduate admissions and undergraduate scholarships. A college student's rank (undergraduate GPA, test scores) is used to determine graduate-school admissions and graduate fellowships. Universities are themselves assigned one-dimensional rankings by *U.S. News & World Report* and other organizations, rankings that give weight to the relative rank of admitted students (GPAs and test scores again) and the relative rank of graduates' salaries. But this Galtonian fantasy doesn't end at the campus gates. A majority of employers still make hiring decisions about graduates based on their rank (undergraduate GPA, test scores) and the rank of their alma mater.

Standardized diplomas assume there is a singular and scientifically cogent unit of education that can be inculcated into any student's brain, regardless of that student's individual constellation of proclivities and capacities, and that every student can acquire this normative set of skills and knowledge by matriculating through the same distribution requirements and core curricula at the same pace and over the same period of learning. In other words, whereas the Air Force presumed there was such a thing as a standardized body, higher education presumes there is such a thing as a standardized brain.

Curiously, academic rankings embody an antithetical claim. The ability to sort students requires that there are meaningful differences in each student's capacity to acquire a standardized unit of education. Following Galton, our educational

system presumes those differences exist on a one-dimensional continuum ranging from the towering heights of exceptional superiority (what Galton termed "eminence") to the unenviable depths of mental inferiority (what Galton termed "imbecility").

Thus, the architecture of our modern system of higher education is predicated upon two antagonistic assumptions about the organ of learning: "Every brain is standardized" and "some brains are superior." That irreconcilable design flaw is evident in the paradoxical demand our system imposes on its students: Be the same as everyone else, only better. To succeed in American college — and, thus, to succeed in American society — you must trade in your uniqueness to be like everyone else, while simultaneously doing everything you can to be better at the same things that everybody else is trying to do.

The Individualists always rejected that demand as both immoral and irrational, but they were overpowered by the Standardizers because they could not back up their moral arguments with science, nor could they offer a pragmatic alternative to the dazzling efficiency of a standardized education. Fortunately, things have changed. Recent developments in the sciences provide the rigorous conceptual grounding for individuality that the Individualists always lacked. Even better, this new interdisciplinary science — known as the science of the individual — finally offers a workable path for transforming our standardized educational cockpit into a true education for individuality.

The science of the individual relies on dynamic systems theory rather than group statistics. Its research methodology is characterized by "analyze, then aggregate" (analyze each subject separately, then combine individual patterns into collective understanding) rather than "aggregate, then analyze" (derive group statistics based on aggregate data, then use these statistics to evaluate and understand individuals). The field obtained its

theoretical foundations with the publication of a 2004 paper, "A Manifesto on Psychology as Idiographic Science: Bringing the Person Back Into Scientific Psychology, This Time Forever," written by one of the pioneers of the new science, Peter Molenaar.

A mathematical psychologist at Pennsylvania State University, Molenaar extended ergodic theory, a branch of mathematics that deals with the relationship of the individual to the group, to prove that it was not mathematically permissible to use assessment instruments based on group averages to evaluate individuals. That proof finally established why most methods of ranking and typing individuals — including the evaluation of students through grade-point averages or standardized aptitude tests — rely on irremediable conceptual fallacies that render such evaluations questionable or even meaningless. In their place, Molenaar offered a new way of thinking about individuals that is profoundly different: "An individual is a high-dimensional system evolving over place and time."

The science of the individual is already transforming many of the basic assumptions and tactics of fields that focus on individuals, including medicine, biology, neuroscience, genetics, and — much more slowly — the social sciences. For example, oncologists have switched their emphasis from standardized treatments for standard cancer to personalized treatments targeting individual cancers. Neuroscientists have begun to abandon their reliance on average brain maps in favor of individual brain maps. Nutritionists are moving from universal dietary recommendations to personalized diets.

Even Fortune 500 businesses are embracing individuality. Google previously hired graduates primarily on the basis of their GPAs, test scores, and alma-mater ranking, while Deloitte (the world's largest management-consulting firm) applied a one-dimensional ranking to all of its employees. No longer. Over the past few

years, Google and Deloitte have adopted individual-focused methods for evaluating employees. But the institution that stands to benefit the most from individuality is the one most beholden to the assumptions of standardization — higher education.

Three key "principles of individuality" derived from Molenaar's definition can serve as the conceptual foundation for an education for individuality. The first is the jaggedness principle, which holds that almost all human qualities that educators and employers care about — including intelligence, character, talent, and potential — are multidimensional and cannot be reduced to a single score, type, or rank. Standardized cockpits impair pilot performance because the human body is jagged. Some critics have suggested that a cockpit is not a great metaphor for the university because the mind is so much more complicated than body size; learning and mental performance are indeed made up of more dimensions than body size, but this means that students are far more jagged than pilots are, and thus make an even worse fit in a standardized education.

Second, the context principle asserts that performance and behavior always depend on the interaction of a specific individual and a specific situation; it is meaningless to evaluate an individual's ability, aptitude, or potential without reference to the particular environment in which the individual will be performing. As research has shown, we are all introverts in some settings and extroverts in others. One direct consequence of the context principle is that there are certain educational contexts for every student where he learns effectively and certain contexts where he learns less effectively. Those "contextual signatures" are more nuanced than merely describing someone as a "visual learner" or a "social learner": A student may learn visually when alone, but not in a group; when surrounded by peers, the same student may learn better verbally. There is no "one size fits all" classroom format.

Finally, the pathways principle affirms that every human learns, grows, and progresses along a unique and highly dynamic pathway; there are no universal norms of learning or development. Though we tend to associate speed with intelligence (and slowness with dullness), ample evidence demonstrates that we each learn different subjects at different paces, which can vary wildly even when learning different elements of the same subject. Our standardized system of education reinforces the view that learning is like climbing the rungs of a ladder: Every student must climb the same rungs in the same order in order to ascend to the same destination (the diploma). Colleges even penalize students who climb a rung at a slower pace than average. When we recognize that each student's pace of learning varies by subject and context and that the optimal sequence of subjects also varies from individual to individual, we see that learning is more like proceeding along a dynamic web, where each act of learning opens up new educational pathways and the optimal choice is different for each student — and it usually makes no sense to rank students on how quickly or slowly they advance.

Together, those three principles of individuality tell us that if we put two students in the same classroom and teach them the same material at the same pace and in the same way, and one student earns an A and the other a C, it is wholly unjustified to characterize the first student as smarter, more promising, or more capable than the other. This is not an article of faith; it is a frank mathematical fact.

There is no such thing as a standard mind. There is no possibility of a standard education.

Dewey and the rest of the Individualists intuited those simple truths, but could not convert their intuition into an effective, holistic plan.

Even today, the idea of redesigning higher education around the principles of individuality might seem hopelessly quixotic. That's how aircraft manufacturers reacted when the Air Force abruptly commanded them to redesign cockpits: They insisted it would be prohibitively expensive. A few suggested that the presumed complexity of an individualized cockpit would impair pilot performance, not improve it. But then, to everyone's surprise, the engineers came up with solutions that were both cheap and easy. They installed adjustable seats. They invented wraparound windshields. They created adjustable foot pedals, helmets, and flight suits.

What seemed impossible quickly became obvious. And the aeronautical engineers learned another important lesson. Individuality was an all-or-none proposition. It made no sense to create adjustable flight suits without creating adjustable helmets. Similarly, all the processes and products of higher education must be redesigned around the assumptions of individuality, or we will end up with a system serving conflicting and incompatible missions. If we adopt individualized educational processes but keep a standardized product (the diploma), then we will create a system that does a better job of making every graduate the same. If we devise an individualized product (like stackable credentials) but maintain standardized processes, then we will create a system that allows students greater personal choice, but still penalizes them when they deviate from the standardized brain. We can fulfill the Individualist promise of empowering all students to become the best they can be, according to each one's individuality, only if we implement a holistic solution.

Flexible-paced competency-based credentialing is one possibility, a holistic solution whose elements have already been separately adopted by American colleges. Instead of ranking student performance in a standardized course, colleges could ask students to demonstrate mastery of a unit of material on a pass/incomplete basis — either they have demonstrated competency, or they

need to keep working on it. Competency evaluations should be similar to the actual professional contexts where the relevant skills and knowledge will be used; evaluations of software-programming competency should be similar to professional coding assignments, evaluations of dark-matter research methods should be similar to the demands of an academic research laboratory, and an evaluation of comedy-screenwriting competency might consist of writing an actual screenplay.

Fixed-duration, fixed-pace courses could be replaced with flexible periods of learning. That might mean a self-paced unit of online learning, it might mean a daily fixed-pace classroom course that lasts a few weeks, it might mean that some courses stay exactly as they are, fixed-pace and one semester long; what matters is that credit hours or semesters are no longer a determining factor in the educational product.

Now the most daunting change: We could replace the diploma with stacked credentials, which offer a more flexible and finer-grained certification of skills, abilities, and knowledge. Aggregate certifications could include, for example, "mobile device-based video-game programming," "dark-matter astrophysics," "Shakespeare dramaturgy," or "urban parks design." Students could also pursue parallel sets of credentials that form a customized mosaic of competency that suits their particular personal aspirations and professional goals; someone hoping to promote educational reform might simultaneously work toward obtaining credentials in "learning theory," "dynamic systems research methods," "20th-century educational history," and "rhetoric and persuasion."

Educators often respond to proposed solutions for individuality not by questioning the feasibility of the solutions, but by questioning the quality of the education that the solutions would deliver. One frequently voiced concern is that the elimination of core curricula will result in a failure to teach some essential

form of humanistic skills or values, such as critical thinking, a sense of civic duty, tolerance for diverse viewpoints, or an appreciation for the arts. Some critics argue that many students need highly structured distribution requirements, either to provide necessary discipline or to expose them to new subjects that might stir them or unveil latent talents. Another common fear is that an education for individuality will increase, rather than reduce, disparities in educational opportunity, slotting wealthier students into tracks that develop humanistic or professional capacities while ensuring that lower-income students are funneled into mere job training. All of those concerns, though understandable, are ultimately misguided. They all rest upon the presumed existence of a standardized mind or a standardized education, and they all place faith in Taylor's conviction that students should conform to the system.

Consider, for instance, the admirable desire to teach everyone standard critical-thinking skills. In truth, critical thinking varies depending on context, such that critical thinking in civil engineering is different from critical thinking in literary criticism is different from critical thinking in behavioral genetics. The nature of critical thinking also depends on the particular jaggedness of a thinker's mind. Instead of settling for the illusion that we can somehow compel all minds toward some standard liberal-arts education, we should grant all students the freedom to develop the particular form of liberal-arts education that they need for their own pathway.

Those who suggest that some students need to be forcefully exposed to distribution requirements are making two errors. First, they're imagining that students fall into one of two static classes (those who need structure and those who don't), when we now know that we are all complex, dynamic individuals who sometimes need structure and sometimes don't. Second, they're imagining that one static, unvarying educational architecture is a sensible way to accommodate one of those two imagined classes. But the best way to accommodate the full

dynamic range of individuals' needs for structure and discipline is to create an equally dynamic educational system that can offer highly structured and disciplined pathways for those who need them, when they need them, and highly flexible and personalizable pathways at other times.

The dehumanizing and specious assumptions of Taylor and Galton not only limit our thinking about learning and instruction; they also limit our thinking about the basic nature of human potential. To illustrate this, let's examine one of the most impassioned and misdirected criticisms of an education for individuality — the proposition that an education for individuality will undermine our hallowed notion of equal educational opportunity.

Equal opportunity is one of the fundamental values of American society. We rightfully believe that a progressive, humanistic institution like the university has a moral obligation to ensure that every student is given a similar chance to succeed, regardless of ethnicity, gender, or wealth. With regard to higher education, we have long defined equal opportunity as equal access. But ensuring everyone the access to the same, standardized system is no different than building a cockpit designed to fit the average pilot, then giving everyone the same chance to squeeze inside.

This is not a particularly noble conception. Fortunately, we can do better. If we accept the principles of individuality, then we must redefine equal opportunity as equal fit.

The Air Force may have been the first American institution to embrace a policy of equal fit, and what happened when it did? It got Col. Kim Campbell. At 5 feet 4 inches and 120 pounds, the diminutive Campbell does not match anyone's notion of an average pilot. But a cockpit designed for individuality empowered her to demonstrate she was one of the best. In one famous incident in the early 2000s, after her fighter jet was shot to flaming rags in Iraq while she was saving an

entire infantry division, she safely landed it in manual mode. The Air Force did not get Kim Campbell by setting out to attract female pilots or designing special airplanes to accommodate women; it got her because it made a commitment to ensuring cockpits fit every body, no matter how jagged. "When I climb in," Campbell told us, "the seat needs to go to its maximum height and the pedals go all the way back — but it fits."

If we want all students to perform at their peak potential, we must redesign higher education to fit the jaggedness of every mind. But as long as we continue to believe in a standardized mind and a standardized education, we will be stuck arguing for equal access instead of equal fit. This is not to dismiss the reality of inequality. But until we stop relying on one-dimensional rankings of students, professors, and universities, the way we conceive of inequality will remain locked into delusory metrics of superiority and inferiority.

When James Truslow Adams coined the term "American Dream," his definition rejected the Galtonian notion of one-dimensional rank and (quite explicitly) the Taylorist notion that we should all conform to the system. Instead, he argued that the true promise of America was that this was a special place where we could all attain excellence on our own terms, according to our own nature. This is the promise of equal fit. This is the promise of an education for individuality.

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