

Spring 2015

## Limitless Schools: A Charter Proposal

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### Abstract:

In this paper, I will endeavor to outline the key elements of a new educational paradigm for a new CMO: Limitless. The Limitless model will to respond to the problem, echoed above and throughout time, by transferring the intellectual work of schooling from teacher to student. The paper rests on the latest research in a number of different fields, each related at least indirectly to education. Most prominently, it is informed by the Japanese pedagogical script. Japan was chosen because it i) directly addresses the problem of insipid transfer seemingly pervasive throughout America, ii) is both coherent and distinct from the American system, and consistently produces excellent results on international tests (OECD 2012). In preparing this document, I reviewed some actual charter school applications, all of which were well over 100 pages. Given the scope of this paper, I limited the model to just this core pedagogical shift and a few other school components that buttress the shift, viz. the teacher community, school culture, and parent community.

Suggested Citation: Schiffres, G. (2015). *Limitless Schools: A Charter Proposal* (Unpublished Education Studies capstone). Yale University, New Haven, CT.

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## **Limitless Schools: A Charter Proposal**

### **Introduction**

Cries to move past the current American model of schooling are nothing new. In 1830, an educator named Warren Coburn announced that he wanted to eliminate “the old system” in which “the learner was presented a rule, which told him how to perform certain operations on figures...But no reason was given for a single step...the results of his calculation seem to be obtained by some magical operation rather than by the inductions of reason” (Green 2014 “Building a Better Teacher,” 87). Almost a century later in 1911, mathematician Alfred North Whitehead lamented education in America as “merely pedantry and routine” (Whitehead 1967). A 1913 study in Portland, Oregon found pedantry everywhere. In geography, “the questions, almost without exception, called for unreasoning memorization of the statements of the book.” In history, “there was not the slightest evidence of active interest in the subject; the one purpose seemed to be to acquire, by sheer force of memory, the statements of the assigned text” (Committee Portland School District 1913, p. 118). And so on. Yet despite endless reforms, in the 1970s American journalist Charles E. Silberman was *still* complaining about “mindlessness” in the classroom (Silberman 1970).

In this paper, I will endeavor to outline the key elements of a *new* educational paradigm for a *new* CMO: Limitless. The Limitless model will respond to the problem, echoed above and throughout time, by transferring the intellectual work of schooling from teacher to student. The paper rests on the latest research in a number of different fields, each related at least indirectly to education. Most prominently, it is informed by the Japanese pedagogical script. Japan was chosen because it i) directly addresses the problem of insipid transfer seemingly pervasive throughout America, ii) is both coherent and distinct from the American system, and

iii) consistently produces excellent results on international tests (OECD 2012). In preparing this document, I reviewed some actual charter school applications, all of which were well over 100 pages. Given the scope of this paper, I limited the model to just this core pedagogical shift and a few other school components that buttress the shift, *viz.* the teacher community, school culture, and parent community.

### **Limitless Classrooms: What?**

If you attended K-12 education in America, you are probably familiar with its pedagogical script: “I, we, you” (Stigler & Hiebert 1999, 99). The teacher presents material (a lecture, formula, etc.); the class practices together with the teacher correcting misunderstandings; then students drill the skill individually.<sup>1</sup> It is easy to see how in such settings, the information provided by a teacher appears to *become* the subject itself. Math is reduced to a set of definitions and functions, history to a narrative of dates and events (*Ibid.*, 59-60). Students *receive* or *execute* but rarely *discover* knowledge themselves<sup>2</sup>. They graduate encyclopedias of facts instead of mathematicians, historians, or practitioners in any field except test prep.

In an attempt to empower student *ownership* of their education, Limitless will employ a different model, based on the contemporary Japanese system. Rather than merely receiving answers, students will (whenever possible) “control the solution method to a problem” (*Ibid.*, 68-69). Consider the following illustration. Suppose the goal for a given 50-minute class were to understand the properties of vertical angles. A typical American teacher might introduce the topic, its definition (angles which share a vertex), and their relationship (equality); then use

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<sup>1</sup> For those unfamiliar, consider the following prototypical example:

<https://www.youtube.com/watch?v=f99w0oGsGcI>

<sup>2</sup> In education circles, this latter activity sometimes goes by such vague and milquetoast monikers as “critical thinking.”

student input to solve a model problem on the board; and finally handout a worksheet of practice problems, perhaps circling to help a student here or there. At the end of 50 minutes, students leave having memorized a relationship and “practiced” applying it.

A Limitless teacher might draw an X on the board and ask students to, on their own, record observations. What facts could be stated about the angles, lines, etc.? After working independently, students would then group up. What generalizable truths might be drawn about the X? Throughout, the teacher would mill about, but not correcting mistakes like the American teacher. Instead, he might model how mathematicians explore new ideas by probing, suggesting syntheses between various concepts, etc. (*Ibid.*, 49)<sup>3</sup>. In a similar model pioneered by Deborah Ball and Magdalene Lampert, the teacher would ask open-ended questions such as “How do you know that” (Green 2014 “Building a Better Teacher,” 92). In one third-grade lesson on whether 0 was even, the teacher “provided the kids with two critical turning points:” directing them back to their ‘working definition’ of an even number and suggesting the students examine whether 14 fit their criteria (Stigler & Hiebert 1999, 77). Finally, the teacher would open up the solution methods from various groups to general critique. If answers varied widely, debate would ensue, students defending their groups’ theories (Green 2014 *op cit.*, 92). The teacher would guide the discussion to the correct answer, then summarize the main takeaways (Stigler & Hiebert 1999, 80)<sup>4</sup>.

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<sup>3</sup> One intriguing implementation might be to line the class walls with white boards (Guggenheim 2013). This way, a teacher could observe every student’s progress simultaneously. I see two potential drawbacks to this 360° approach. The first is that students could evade struggle by peeking at a neighbor’s work. The second is that they would be unable to save work for later reference. This second drawback might be mitigated by the adoption of SmartBoards (or their ilk), so students can store board work digitally.

<sup>4</sup> Normal opening questions would be richer and more complex than this. For relatively simple topics like this, the whole cycle might repeat twice or more within a single class period. NB: It is

In both the American and Limitless models, students *leave* the classroom with the same solution method in the same amount of time. The difference lies in the process of realizing that solution. In the Limitless process, students bear the onus of intellectual activity.<sup>5</sup> “I, we, you” becomes “you, y’all, we” (Green 2014 “Why Do Americans Stink at Math?”). Student energy focuses on the subject rather than the teacher (Khan 2012, 25). In fact, the teacher’s unassuming role makes him a more clear support for the *student’s* project, akin to a coach (*Ibid.*, 116).<sup>6</sup> The teacher, a helpful but non-dominating guide, might offer personalized, concise, educative pointers; he would no longer, however, *bear* knowledge and force it onto (often unwilling) students.<sup>7</sup> And students will no longer be calculators or regurgitators but buccaneers on their own mission.<sup>8</sup>

Although this is its essence, the Limitless model acknowledges that some material simply must be transferred and mastery must be confirmed. In Japan, students sometimes begin class by memorizing facts or equations *so that* they can use them to explore more complex problems later in class (Stigler & Hiebert 1999, 50). Limitless will leverage technology to replace this in-class scaffolding. Lectures or readings will be provided on a digital portal for students to peruse before class. After class, students will answer formative assessment questions on the digital portal

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unlikely vertical angles would take 50 minutes to cover in an efficient American classroom either.

<sup>5</sup> I like the image of a teacher setting the class compass but students pulling the oars.

<sup>6</sup> In sports or other extracurriculars, adults are there to aid direct engagement with an activity. The student and goal face each other, and the coach stands on the side. In the American model, by contrast, the teacher often feels like the center of attention and energy.

<sup>7</sup> A teacher will give increasingly helpful clues, tips, and pointers as time elapses. It is ideal that at least one group at least comes close to solving the problem. If no one solves it, then the final period will be devoted to exploring why suggested answers fail, and why the correct answer (at that point either coaxed out by the teacher or given directly) succeeds.

<sup>8</sup> Experience suggests that puzzling over problems and conjecturing solutions are vital parts of “doing math.” Just memorizing that addition means “how many more” tends to make math insipid and uninspiring (Green 2014 “Building a Better Teacher,” 53).

(although far fewer than American students currently do for rote memorization) (Khan 2012, 55). Limitless would thus reserve creative endeavor mainly for the classroom, keeping out of the class a) the transmission of data and b) objective evaluation (*Ibid.*, 99).

### **Limitless Classrooms: Why?**

*Myelination:* The fundamental problem with the American model — which gives answers, then rehearses them to minimize mistakes — is that it runs counter to how the human brain actually learns. As the chair of psychology at UCLA, Robert Bjork, describes, “We tend to think of our memory as a tape recorder, but that’s wrong. It’s a living structure, a scaffold of nearly infinite size” (Coyle 2009, 19). The passive reception of an answer, in other words, has minimal neurological effect. To learn deeply, we must struggle on the edges of our ability, fail, and correct ourselves.

The neurological effect of this learning is called myelination. When we master anything new (a concept, a skill, etc.), all we really do is connect two previously unrelated neurons. If we fall short, it’s because of a weak connection: an electrical pulse either diffuses before reaching the second neuron or reaches it at the wrong time. To improve is really just to insulate that electrical wiring, enhancing the pulse’s strength, speed, and accuracy. To wrap that insulation (called myelin), we must fire failed electrical pulses (*i.e.* wrestle with an endeavor) (*Ibid.*, 32).<sup>9</sup> “One real encounter,” one attempt which requires effort and results in a mistake, “is far more useful than several hundred observations,” says Bjork (*Ibid.*, 18)<sup>10</sup>.

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<sup>9</sup> As far as I understand, oligodendrocytes are attracted to electricity and, upon sensing it, excrete a gel of myelin, which then insulates the relevant pathway (Coyle 2009, 32).

<sup>10</sup> In a study, psychologist Henry Roediger at Washington University of St. Louis divided students into two groups. Group A studied a text four times. Group B studied the text only once,

Such “observations” comprise the typical American lesson. Information is presented, as if to be recorded by the proverbial tape recorder. Then, when practicing the material, teachers intervene as quickly as possible to correct mistakes *before* a student fails. Electrical pulses need not be fired at all. The Limitless model, by contrast, better conforms to memory science by aiming at “targeted, mistake-focused practice” (*Ibid.*, 34). Students must *struggle* for an answer, err, then correct their error (either through collaboration with peers or a teacher’s guidance) (Coyle 2009, 16).

*Consolidation:* Long-term memory is actually a function of consolidation: systematically associating new information into an already established memory pattern (Khan 2012, 48). The American model too often militates against this neurological fact as well. In a sample of US classrooms, teachers explicitly connected parts of a lesson to each other only 40% of the time (much less to other lessons, units, or subjects). By contrast, 96% of Japanese lessons contained such organizational cues (Stigler & Hiebert 1999, 62-3). Moreover, Japanese teachers write on the board from left to right without erasing (*Ibid.*, 74). This technique, which Limitless will emulate, establishes a cumulative record of the lesson through which students can visually journey (*Ibid.*, 96).

The Limitless model lends itself to conceptual consolidation. When teachers simply present a *discrete* factoid to memorize, relating it to previous knowledge requires additional (and often unexpended) initiative on behalf of students. Inventing, exploring, or discovering that factoid on their own, however, forces students to establish those logical connections. To succeed, they must draw upon and relate previous knowledge. Teachers can facilitate this during the

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but was tested on it three times in the session. A week later, Group B was 50% better at recalling information from the text, despite studying it for  $\frac{1}{4}$  as much time (Coyle 2009, 18).

lesson by establishing “fence posts”—conjectures and contributions by specific students which advance the discussion. Identifying “fence post” concepts as they emerge help the class (or group) peer backward over the landscape of its evolving understanding, naming key turning points (Green 2014 “Building a Better Teacher”, 81).

Just as important, this model does not arbitrarily favor certain styles of thinking. There are many ways to understand and systematize much of what we learn. Area can be length times height *or* the sum of 2D geometric space. By directing their own learning, students will default to that conceptualization which makes most intuitive sense for them. We will not insist everyone understand something in the same *way* as the teacher. Moreover, by coming up with wrong answers, students will deeply understand *why* those ideas do not fit into the schema. Thus, the Limitless model allows for the reality that different students best consolidate new information in different ways.

*Leveraging Teachers:* Much of a typical American teacher’s job could be performed by an automaton (Stigler & Hiebert 1999, 80).<sup>11</sup> The Limitless model focuses teachers’ energies on areas for which they are uniquely qualified, *viz.* coaching not demonstration. Whereas lectures remain constant, coaching depends on personal, human connections. A coach must understand her pupil on all levels — psychological, intellectual, emotional — in order to interpret *how* his brain fires electrical pulses and *which* cues would best direct them (Coyle 2009, 198). For teachers, as for doctors, the question is not “What is the best behavior? It is, How do I decide which of many behaviors to deploy in the moment. It was a problem of diagnosis” (Green 2014

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<sup>11</sup> For a plurality of her time, the American teacher conveys content. That content can be recorded and displayed digitally. Limitless teachers require what Lee Shulman calls “pedagogical content knowledge”—content knowledge deep enough to see how students could misunderstand, then the pedagogical savvy to correct them (Green 2014 “Building a Better Teacher”, 63)

“Building a Better Teacher”, 37). The Limitless model liberates teachers to focus on diagnosis: thinking about student thinking (*Ibid.*, 39). They will be disengaged enough from “actively” teaching so that they can stay one step ahead of students and, when they founder, offer just enough direction to keep them afloat. And as they succeed, teachers can be there to push them just a little further outside their ability zone (Coyle 2009, 187)<sup>12</sup>. Their role will not be to cheerlead, conveying pleasure or displeasure, but offer concise, targeted advice<sup>13</sup>. Adjusting a message in order to connect with and inspire a specific student requires the irreplaceable art of teaching (*Ibid.*, 165).

Teacher qua coach also align better with my philosophical ends of education. So long as teachers continue to be the *font* of knowledge, they will remain requisite components of the educational equation. For full liberation, a student must come to seek truth *on his own*, dependent on no one else for beliefs or worldviews. “A teacher,” as Thomas Carruthers said, must “make himself progressively unnecessary” (*Ibid.*, 196). Hence, teachers should work to empower students *at the expense* of their own influence. This mindset, in which teachers are on *students’* side, will hopefully engender teachers to students. How come everyone loathes their teachers but loves their coaches? The typical American teacher appears to present challenges of arbitrary information which students must breach via test lest they be humiliated or held back (Khan 2012, 200). The Limitless model will hopefully flip this so teachers are no longer adversaries but allies on student-led projects.

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<sup>12</sup> Coyle calls these “GPS reflexes.” A good coach has a certain probing, strategic impatience, always elevating you higher: “Good, now do \_\_\_\_\_” (Coyle 187).

<sup>13</sup> A study of one of the most effective basketball coaches of all time, John Wooden, found his feedback was 7% pleasure, 7% displeasure, and 75% pure information. The specific information helped his team correct mistakes (*i.e.* electrical misfires), myelinating the proper pathway (Coyle 169)

*Leveraging Technology:* Whereas humans excel at extemporaneous personalized coaching, computers are uniquely qualified for generic grunt work. For centuries, we outsourced the work of data transmission to textbooks alone. Computers promise a superior means to realize this traditional goal (*Ibid.*, 35)<sup>14</sup>. Videos allow the transmission of not only text, but pictures, sounds, and all sorts of visual demonstration. And unlike textbooks, teachers can customize the material to their class goals. A very simple example of this might be reducing pre-class lessons to 10-18 minutes — the average student’s attention span, but implausible to implement in a classroom lesson due to travel time (*Ibid.*, 29). Finally, unlike in-class data transmission, this method holds student mastery as the constant and sets time as a variable. In Finland, a similar mastery-based policy (which eradicated tracking) led to better learning outcomes for erstwhile underperformers (Sahlberg 2011, 45). Just as important for my own ends of education, mastery conditions led students to accept greater *ownership* for their learning (Khan 2012, 43). Technology really allows students to take responsibility for their learning. If a student misses a point, she can now rewatch or redo the lesson until comprehension (as she always could with reading assignments) (*Ibid.*, 17). Finally, by allowing students to leverage long commute times, digital pre-class content would facilitate expansion of Limitless to rural schools (Smarick 2014, *Bellwether Education: Utilizing Charter Schooling to Strengthen Rural Education*).

For post-class formative assessments, computers allow student data to be instantly recorded, visualized, and shared with teachers, students, and parents. A family could log on and

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<sup>14</sup> It is not clear whether replacing textbooks with an online portal would be cheaper or more expensive in the long run. Creating the digital infrastructure the digital infrastructure (e.g. lectures, test questions, etc.), and perhaps providing laptops or tablets, would require a large initial investment. Once built, though, the portal would be increasingly cheap to sustain. Annual textbook expenses, by contrast, seem to only be increasing.

view a list of mastered and unmastered content standards.<sup>15</sup> Families could, for instance, work on practice problems together. In formative assessments, questions could adjust automatically to mirror ability. Students who breeze through simpler questions might be given more complex problems; students who struggled with a topic might receive a refresher question on it a week later (Khan 2012, 85)<sup>16</sup>. Furthermore, the best formative assessment questions and lecture material can be *shared* within Limitless, creating an economy of scale for this material. As the CMO grows, each teacher will have more and better resources from which he can assign pre and post-class work.<sup>17</sup>

*Character:* The Limitless model begins with a complex question. Confusion, frustration, and failure are not only accepted parts of knowledge acquisition; they are expected (Stigler & Hiebert 1999, 89-92). The American process, by contrast, begins with a solution, then moves to a sample problem, then a series of relevant drills. Failure and mistakes, even when made with care, are stigmatized (*Ibid.*, 42). “It was effortless” and “she got it so quickly” are high marks of praise.<sup>18</sup> It is perhaps unsurprising that even at highly functional American models, like KIPP in

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<sup>15</sup> I picture not only a raw data table but also a knowledge map, bar graph, etc. that can be adjusted, by unit, level of mastery, etc.

<sup>16</sup> Answered questions could also link to relevant review resources in the portal or online.

<sup>17</sup> Teachers will also have an intranet to share lesson plans, handouts, etc. That, though, would likely not be on the student portal.

<sup>18</sup> I am unsure how pervasive these cultural values are outside the United States. An anecdote from the Toyota chairman suggests they are not so cache in Japan. A subordinate recalls, “One Friday I gave a report of an activity we’d been doing, and I spoke very positively about it, I bragged a little.’ ... I could see [the chairman] was puzzled. He said, “Jim-san. We all know you are a good manager, otherwise would not have hired you. But please talk to us about your problems so we can all work on them together” (Coyle 211). In a professional context, and by inference in academic contexts too, admission of struggle and failure seems to be encouraged.

its early years, only 21% of students made it through college. Unless they are taught it in school, many of these students never absorb the “grit” to bounce back from their first college failure.<sup>19</sup>

The Limitless model helps mitigate this deficit by explicitly and implicitly nurturing the habits and attitudes required for later success. As mentioned students who “control the solution method” necessarily acclimate to independent pursuit, failure, and group work. They also develop habits less obvious than resilience and collaboration. By maintaining regular time for focused problem solving, the Limitless method instills what psychologists call “conscientiousness” — the ability to self-motivate and control impulses, especially in low stakes / low rewards situations (Tough 2012, 70). Additionally, a teacher’s concrete interventions<sup>20</sup> nurture an attitude of mental contrasting rather than pessimism or optimism (*Ibid.*, 54). Pessimism (concentrating only on obstacles) and optimism (concentrating only on desiderata) rely on the premise that permanent, pervasive factors outside of a student’s control determine her success.<sup>21</sup> It is easy to see how this binary could permeate in the American model: either you follow the speed of the class, so the class is “easy” for you, or you don’t, so you are “slow.” Mental contrasting instead entails concentrating on i) an outcome, ii) acknowledging obstacles, and iii) establishing specific plans to overcome them (*Ibid.*, 93). The Limitless model

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<sup>19</sup> Not to mention, many lack social pressures (*e.g.* familial expectations) towards college graduation.

<sup>20</sup> Myelination requires specific, concrete pointers, not motivational diatribes. This will be the standard model of teacher-student interactions.

<sup>21</sup> Examples of relinquishing agency include the tropes “I’m just bad at math” and “it’ll all be okay in the end.” Neither belief allows that individual action can alter destiny. Character qualities like conscientiousness are believed to significantly impact one’s life outcomes. This is why, it’s hypothesized, GPAs, even from low-quality high schools, predict college success much better than SAT scores (Tough 2012, 153). The SAT more or less represents a single shot at success or failure. But college, like high school and life in general, requires continuous mental contrasting to overcome the obstacles which emerge.

proverbially “creases” the mind so that, in college or some other future challenge, it naturally bends towards mental contrasting.<sup>22</sup>

More than just expedient or utilitarian virtues, Limitless will aim to cultivate the character of men and women fit to be free. Schools should help students realize their autonomy. Far from this, our current paradigm derives from a Prussian school system designed *explicitly* to subjugate citizens. Prussians were to be subjects, not masters. They were to march in lockstep conformity with the ideology of their superiors and the prevailing wisdom of their milieu. As Prussian school designer observed, “If you want to influence a person you must do more than merely talk to him; you must fashion him, and fashion him in such a way that he simply cannot will otherwise than what you wish him to will” (Khan 2012, 76). American policymakers were to imitate this, according to education analyst Melissa Roderick, in order to produce society’s factory workers (Tough 2012, 161). Limitless will militate against preparing tractable puppets. Instead, we will draw on the more ancient tradition of Jewish yeshivas and Aristotle’s peripatetic school. Students will work together and with a teacher to design *their own* constellation of values and understanding.

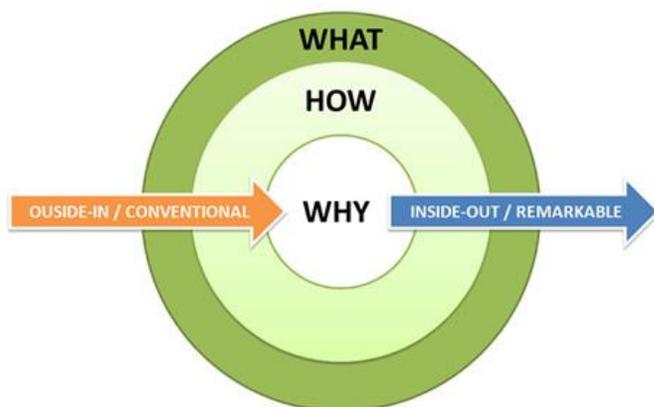
*Ignition:* To truly humanize children, we must move them from pedagogy to androgogy. Androgogy, the education of adults, places responsibility for learning on the learner himself, not the teacher (Khan 2012, 175). This transition occurs when children view themselves not just as *students* who are learning a subject but actual *connoisseurs* of that subject. The Limitless model helps children affirm themselves as such. In a computer science class, for instance, students

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<sup>22</sup> This insight about the importance of habits in character development traces back as far as Aristotle’s *Nicomachean Ethics*. Margaret Thatcher sums it up best: “Watch your thoughts, for they will become actions. Watch your actions, for they’ll become... habits. Watch your habits for they will forge your character. Watch your character, for it will make your destiny.”

would be asked to solve real world problems, not just to memorize preestablished algorithms. As actual practitioners of computer science, they would more likely *feel* like computer scientists. This identity and sense of future belonging serves as the ignition for genuine, myelinating deep practice (Coyle 2009, 108). As Malcolm Knowles notes: “If we know *why* we are learning and if the reason **fits our needs as we perceive them**, we will learn quickly and deeply” (Khan 2012, 175, emphasis added).

This is not a novel concept. In Japan, teachers never felt compelled to apologize for their material. Teachers and students understood grammar lessons, let’s say, were not arbitrary burdens but requisite steps advancing the projects of student-cum-writer. In Finland, they call this “inspiring intrinsic motivation,” and it is partially credited of their amazing results (Sahlberg 2011, 16). Even charter schools today recognize this important symptom, even if they miss the underlying logic. In *Teach Like a Champion*, today’s charter-school pedagogical bible, Doug Lemov advocates for teachers to stop “[apologizing] for teaching worthy content” (a technique called “Without Apology”) (Lemov & Atkins 2010, 51). The Limitless model achieves this naturally by reversing the usual flow of what Sinek calls The Golden Circle, *i.e.*



(Sinek 2009). In the American model, content is presented and memorization enjoined. Students first hear *what* to do, then *how* to do it, and only finally, *why* (“this will be useful in a later class;” “this will help you get into college;”

“this will make you competitive in the workplace”). Math becomes tiresome, arbitrary equations for some goal that *feels* distant and inapplicable. So in an ersatz effort, students will blindly imitate a procedure rather than genuinely journey towards the answer (Green 2014 “Building a Better Teacher”, 88).

By establishing a student as a *mathematician*, though, Limitless will begin at the heart of the circle and work outwards. Students will ignite for the same reason that a kid taking violin lessons refuses to practice but another who identifies as a musician will practice until his fingers bleed. The Limitless model aims to leverage the power of purpose.

### **Teacher Community**

Much of the success in Finland, Korea, and Japan has been attributed to the professionalization of teaching staff (Sahlberg 2011, 76). Professionalism, of course, has a plethora of dimensions, many exogenous to school policies. Rather than tackle this problem holistically, Limitless will focus on levers for changing attitudes within our community.

*Teacher Time Allocation:* In many schools, teaching is essentially a service profession, not so different from cashiering. Administrators (department stores) hire teachers (cashiers) to execute services (checkout) indirectly paid for by families (customers). Of course, teachers at Limitless will uphold this service aspect of their job. But they will also have a role in shaping the structure of the organization as a whole (in the analogy, the department store). To illustrate this responsibility for collegium *writ large*, imagine a faculty counsel with sundry committees, some standing, others ad hoc. These committees will identify shortcomings in the school, brainstorm solutions, research the latest scholarship / best practices / ideas, and eventually put forth a proposal or product for larger counsel consideration. One committee might develop workshops

for teachers to learn data analysis. Another might tinker with the schedule. A third might augment the online portal to better serve community needs. Every aspect of the school would be open to systematic, concrete improvements (Stigler & Hiebert 1999, 112).

Procedures will be established to integrate this work into a given school's functions, allowing the school to operate like a laboratory. For the faculty counsel to approve a committee's report will be tantamount to approving a new *experiment*. Hence a committee's work will be ongoing. Only if the experiment proves beneficial will the proposal be codified into school bylaws. The continual and immersive nature of these proposals should, if the experiences of lab schools in the US, Japan, and Finland can guide us, help make committee work more meaningful and community growth more holistic (Green 2014 "Building a Better Teacher", 81).

Procedures will also be established to integrate successful experiments into the *CMO's* institutional memory (Stigler & Hiebert 1999, 114). Teachers throughout the network should be able to employ and build on the work and ideas of their colleagues. Transferring published products and proposals allows the network to grow together. Moreover, it will generate a feeling that teachers are contributing to the larger *profession's* knowledge base (*a la* medical journals)<sup>23</sup>. In the spirit of Francis Parker and John Dewey, Limitless will aim to accrue pedagogical and educative wisdom (Green 2014 *op cit.*, 20). With a time commitments for committee work, faculty will have real agency to direct school culture, operations, etc. — not radically, but in slow, deliberate, concrete steps (Coyle 2009, 211).

Finally, in Finland, teachers need only be *in* the school building to a) teach their classes, b) meet with students, or c) oversee some school function (Sahlberg 2011, 90). Limitless would

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<sup>23</sup> In Japan, a lot of respect for teachers comes from their contributions in nationwide working groups (Stigler & Hiebert 1999, 114).

adopt a similar policy. Like other professionals, teachers can work from home or a nearby café or wherever they prefer. It is their performance and work output which will be evaluated, not their input; thus input need not be monitored.<sup>24</sup> In many ways, Limitless will use the traditional model of an American professor rather than that of an American teacher to inform the perception, expectations, and responsibilities of our teachers. Like tech companies, as well as some ed organizations such as Tennessee’s Achievement School district, Limitless will try to project a productive, purposeful, and empowering culture to current and potential employees (Smith 2013, 23).

*Leadership Roles:* Limitless will expand its leadership opportunities beyond merely roles pertaining to educational research and schoolwide planning (head of a committee, author of a pivotal report, etc.). Emulating a successful model established in Washington DC (Leadership Initiative For Teachers), Limitless will also offer opportunities to teachers *qua* pedagogues for professional advancement, increased responsibility, and prestige (Superville 2015). Teachers might, for instance, become department heads or master teachers, tasked with training apprentices (Coyle 2009, 112). In fact, given our arcane theory of learning, Limitless will need a robust apprenticeship program, and with it, a delineated hierarchy. Teachers acculturated to the American pedagogical script would have to shadow a master teacher—singled out for his or her excellence—to absorb the Japanese model. Apprenticeship will continue until teachers-in-training understand the logic behind “practices that seem unnatural, if not bizarre” (Rich 2014).

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<sup>24</sup> We have a staggeringly limited knowledge of pedagogy and the ancillary functions of a teacher—“the black box of the production process,” as Eric Hanushek calls it. Teaching qualifies as a profession, in part, because it is too complex to reduce to an evaluable procedure (Green 2014 *op cit.*, 44). Limitless views teachers as equal members of a team, united in mission and trusted to pursue shared goals as they think best. They will be evaluated on whether they achieve those goals (*e.g.* results on summative assessments, positive feedback in parent and student surveys, successful collaboration with colleagues, etc.)

That might take a year or two, during which the program would slowly increase apprentices' classroom responsibility. After some time teaching solo, program participants would be eligible to continue in a hands-on principal training program inspired by the KIPP model (Prothero 2015).

Naturally, these honors and obligations would correspond with higher salaries. In fact, teacher salaries will likely constitute the largest single expenditure at the school. Like the Equity Project in Brooklyn, which received 600 applicants for 8 slots, Limitless will pay to attract the best talent (Auguste, Kihn, Miller 2010, 41). The most promising applicants will be identified *inter alia* by statistically significant factors such as academic proficiency, teacher verbal ability, and teacher content-area knowledge (Goldhaber & Anthony 2003, 18; Bond 2001, 63; *Ibid.*, 64). To offset the cost of successful teachers, salaries will be distributed over a wide curve. Teachers at the bottom of the hierarchy, as well as any other paraprofessionals employed, will receive significantly less than those with the best output.<sup>25</sup>

### **School Culture**

*Collegiality*: A school's "culture" encompasses a wide, nebulous category, affected by all actions, bylaws, and attitudes therein. This section will touch on a hodgepodge of salient aspects.

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<sup>25</sup> "Educators and educational policymakers frequently allude to the eye-popping compensation earned by lawyers and doctors yet rarely note that this is directly related to the role played by specialization and support staff. Many employees in law firms and medical practices are not especially well compensated. Clerical staff and paralegals in law firms routinely make one-third of what junior attorneys make and one-fifth or even one-tenth of what senior attorneys make. If doctors, lawyers, and all their ancillary and support staff were lumped together and paid the same, the enormous number of support staff included in any such calculation means that the overall pay of these generic professionals would look a lot more like that of teachers. Given the current dollars expended for salary, it would be no great feat to pay \$150,000 a year to the top half-dozen teachers at the typical elementary or high school if roles and compensation were redesigned appropriately" (Hess 2009).

The first is rules and policies that we hope will nurture collegiality among students and between students and teachers. For instance, Limitless will have a dress code for both students and teachers. Teachers will model formal workplace attire in suits or their equivalent. Students will wear a uniform. (Sartorial expression both emphasizes wealth differentials between students and distracts from learning (Stigler & Hiebert 1999, 28).) In most interactions, unless they are close friends and in an informal setting, teachers will be encouraged to treat students as a professor would a pupil. This includes shaking students' hands and even addressing students with the formal salutation "Mister" or "Miss" and their surname. One hopes that signaling equal status to students will encourage them to embrace their role as young *adults* and act accordingly.<sup>26</sup>

In the same vein, it will not be unusual to see teachers eating lunch with students. While this will not be required of any particular teacher at any particular time, it will be strongly encouraged until an embedded and perpetuating norm develops. Teachers might approach a group of students and ask to join them, like a peer. Alternatively, students may ask a teacher to lunch to discuss a topic or develop a mentorship.<sup>27</sup> Similarly, teachers would stay with students after school. Each day until 6:30, a group of 2-3 teachers would stay in a common area with any students who want that safe space for working or socializing.<sup>28</sup> The teachers could either play

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<sup>26</sup> This same psychological tendency, I believe, leads people to behave more formally when wearing suits or their equivalent.

<sup>27</sup> Nurturing can positively influence gene expression. Importantly for schools, they can chemically reduce the neurological stress load (*i.e.* allostatic load) which impedes executive function (Tough 2012, 28). These sorts of cultural norms are aimed at fostering caring relationships between adults and at-risk students. Other ideas for such relationships include somehow pairing troubled students with their older on-track peers or, following a program in Chicago, non-school neighborhood mentors (*Ibid.*, 45).

<sup>28</sup> Teachers who take on roles as extracurricular mentors which require a similar time commitment would be exempt from these shifts. A recent study of New Orleans parents revealed that low-income parents disproportionately seek schools with robust extracurricular programs (Harris & Larsen 2015, 28). To attract this niche, Limitless would make sure to offer a smattering of activities, during and after school, for students. Students would also be allowed to

with the kids—billiards, ping pong, chess, etc.—or complete their own work (*e.g.* grading papers, lesson planning, etc.) Either way, minimizing the teacher-student divide will hopefully i) nurture soft skills through a plethora of informal interactions, ii) nurture relationships that keep more formal interactions (*e.g.* in the classroom) respectful, and iii) maintain order on school grounds and monitor student growth.<sup>29</sup>

Another way to unite the student body will be through shared schoolwide experiences. This might be as simple as community shout-outs when any individual or club succeeds. Imagine the principal announcing at the weekly assembly how the track team performed or when a student won recognition for her writing. If one of us flourishes we should all take pride. Other shared experiences could take the form of joint literary pursuits. This might mean students across grade levels read the same book over the summer. It could also mean weekly memorization assignments, such as learning 6 lines from a poem or famous speech. This would then be evaluated during homeroom (or its ilk) and factored into a student's grade. In my ideal scenario, a common vocabulary of extemporaneous allusion will envelope the Limitless community, as it does here at Yale. At the least, it will expose students to some classic rhetoric in the Western Canon.

*Classrooms:* Since teaching and learning follow mutually understood scripts, we must begin indoctrinating Limitless students early (Stigler & Hiebert 1999, 114). Perhaps we would only take students beginning in prekindergarten, or maybe prekindergarten and 5<sup>th</sup> grade (the first

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start their own clubs, so long as they were overseen by an adviser and deemed developmentally productive.

<sup>29</sup> Jeff Nelson at OneGoal identified the following soft skills as critical to long-term success: resourcefulness, resilience, ambition, professionalism, and integrity (Tough 2012, 162). I have not decided which specific characteristics Limitless will prize, but once established, they will permeate Limitless culture. Individual schools may even be named after them, *e.g.* Limitless Honor or Limitless Imagination.

years of Limitless elementary and middle schools respectively).<sup>30</sup> Since myelin never *unwraps*, habits are hard to break (Coyle 2009, 45).

The actual classroom itself should be sacrosanct. In a study, 31% of US classes were interrupted by, for instance, a PA system or a visitor who entered to request something (Stigler & Hiebert 1999, 96). Nobody, by contrast, interrupted Japanese classrooms; teachers could trust their lessons would be cohesive, self-contained experiences (*Ibid.*, 96). Students would be expected to use the restroom *before* class, and everyone would be given a personal water bottle to stay hydrated and avoid distracting water breaks.

Small class sizes, while nice if affordable, would not be a top priority, at least not as students got older. Data suggest the importance of class size decreases significantly after elementary school (Krueger 1999). Furthermore, the Limitless model compensates for the benefits of small classes in other ways. The soft skills development that small-class advocates tout should be just as easily achieved in the mandatory small group work of a large Limitless classroom. Perhaps more important, large classes with the Limitless model will be less taxing on the teacher. Instead of conveying information to an ever increasing number of students—a logistical nightmare--the Limitless teacher only has a little less time to stop and chat with each workgroup. While not negligible, I imagine this would be much more manageable than teaching a large class in the American style.

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<sup>30</sup> Schools will be broken up PK-4, 5-8, and 9-12. This division two main advantages. First, it allows a larger mixing of ages and maturity within each division. Second, it spreads fixed resources more evenly among students. Each school will, for example, have a principal. It makes little sense to weaken supervision in a K-6 elementary school in order to provide heightened oversight in a 7-8 junior-high school. The same logic applies to smoothing usage for buildings, another fixed resource.

*Aesthetics:* Limitless classroom decorations will be plain and minimalist. Best practices dictate that distracting displays, such as motivational posters, etc., be reserved for outside the classroom (Coyle 2009, 98). In common areas, however, Limitless will try to appeal to the unconscious mind (which can process 11 million pieces of info at a time) in order to spark ignition (*Ibid.*, 118). Role models will be plastered on the walls with the aim of triggering the thought: “Hey that could be you. Better get going” (*Ibid.* 130). Rooms will be named after heroes worthy of emulation (*Ibid.* 150). Exhibitions of great and timeless art will line the walls (with panels explaining the works). Inspirational texts, such as the Gettysburg Address, will be posted around. Like tracts of schoolwide memorization, this décor will expose students to even more cultural capital and enriching material. Cycling the displays through great art and texts will lead to even more gains through osmosis. Hallways should incorporate artists, thinkers, and writers that students might naturally see as future versions of themselves. On Brighton Beach, that might mean including an essay by Tolstoy; in Harlem, it could mean Langston Hughes.<sup>31</sup>

*Nontraditional Classes:* English, math, science, and history are some of the hallmarks of the traditional American education. Limitless would continue these as essentials, but include other mandatory classes as well.

- 1) Philosophy classes, beginning at a young age and then ongoing, which comprises both the history of philosophy and direct philosophical engagement. Philosophical training has so many positive externalities throughout a school that it is hard to understand how it fell out of vogue. To start, philosophy teaches us how to construct sound arguments. What are the technical features which make a premise plausible and a

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<sup>31</sup> NB: this influence should be light and occasional. It would be tragic to unnecessarily limit a child’s cultural inheritance because of the accident of his race, sex, or ethnic background.

sylogism valid? The humanities are often derided as squishy, easy subjects where everything is simply a matter of opinion and nothing can ever be wrong. Obviously this is nonsense. Although rich with narrative elements, English and history scholarship *should* rest upon theses as defensible as a math or science proof. Once they learn *how* to structure arguments with rigor and clarity, students will naturally bring that paradigm of thought to their other subjects. For example, studying logical pitfalls such as fallacies and confirmation bias will help students in any field that requires them to marshal evidence to support a claim (Tough 2012, 140).

Deliberately reflecting on the nature of one's life and how to live it also effects a host of salutary, expedient byproducts. This is the most direct way for aimless children to identify purpose in their studies and schoolwork. It also generates a methodology for empathy: "consider the other position," "what about this reason that had not occurred to you," "how might this action affect another" are all commonplace questions in an entry level philosophy course. Additionally, rational inquiry leads to understanding, and understanding our lives often dispels despairing helplessness about our situations. This supports the previously discussed goal of promoting mental contrasting. Carol Dweck has shown that children perform better when they believe intelligence is malleable, a product of effort not birth (Dweck & Blackwell 2007).<sup>32</sup> I know that as a child, I often felt like I was stumbling blind and submissive through a world larger and more mysterious than I could possibly comprehend. Insofar as philosophy sheds light on the questions which plague every young adult's mind, it empowers them to realize agency in the world and their lives.

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<sup>32</sup> For this reason, Limitless teachers will never praise students for "getting the answer right." All praise will be directed towards the effort and approach.

Most importantly, reflecting on philosophical questions is supremely valuable *eo ipso*. Nothing helps students realize their human potential more than *discerning* truth through reason (rather than accepting it blindly from an elder); setting the compass for their own lives; deliberately choosing their actions. Philosophy gives students the toolkit to make sense of life's questions.

- 2) Introductory economics, beginning in middle school (when students begin to form their own opinions *vis-à-vis* political economy). Economics courses are essential on at least three accounts. First, students need the science to complement their own financial literacy. How could you make an informed decision about buying a bond if you, say, didn't understand the function of the Federal Reserve? How would you know to avoid the sunk cost fallacy? As long as students will be dealing with money, resource, and the modern economy, they need a basic background in how it works.

Second, *we* as a society need citizens capable of evaluating their leaders' proposed economic policies. Voting is a collective action, and an economically illiterate populace can only portend disaster. Third, students need economics to interpret current and historical events. Resources undeniably influence the actions of people and nations. Often, this influence lies latent (*e.g.* the American Civil War was ostensibly fought for states' rights). Without a background in economics, students will be inept at identifying and understanding the hidden motivations that move and shake the world.

- 3) Computer science, beginning in at least high school. Like philosophy, computer science offers a methodical, structured way to evaluate problems. In many ways, it is like learning a new language. That alone, however, is not enough to require it as a curricular mandate. Computer science is necessary merely by dint of the increasing importance of

computers in our world. It is unacceptable for students to remain ignorant of such an imposing global force and such a quotidian aspect of their lives. Cellphones, computers, etc. must be understood as more than just magic boxes. As laptops become cheaper, I imagine it will be financially feasible to equip students with them from a young age. That said, various programs, such as Computer Science Unplugged, offer challenging curricula for teaching computer science *without* the computer (Paul 2014).

- 4) Non-traditional history courses, beginning in elementary school. Currently, American public education places a curious and outsized emphasis on American and European history. These two subjects are often studied repeatedly, throughout middle and then high school. Asian and African history, however, are almost never touched upon. I understand importance of focusing on our own history *more* than others', but the proportional tradeoff strikes me as preposterous. Limitless students will not be able to graduate without one thorough, demanding yearlong course on the history of each the Asian and African continents.
- 5) A mercurial "Life" class, beginning in elementary school. There are plenty of skills and knowledge which fall in the "miscellaneous" category of pedagogical taxonomy. These diverse fields we will lump together into an annual but ever rotating "Life" class. One unit may focus on nutrition: What are the scientific differences between fats? Which foods have various vitamins, and how do they interact? How much protein does your body need after working out? Another unit might be on sleep science—its importance, how to get it, what aids and impedes it, etc. During the course of 12 years, Life class would cover everything from sexual education to financial literacy (at age appropriate times, of course). Students perform better when they understand how their brain

myelinates, so that information would be incorporated into the study habits section (Coyle 2009, 217). Life classes might even include practical civics, such as one's rights when dealing with the police, the ins and outs of criminal proceedings, etc.

*Data:* As previously mentioned, a focus on data will permeate the Limitless community. Each question on a post-class assessment will track to a standard or substandard on the final state assessment (given that one both exists and meets Limitless standards for rigor). If a state test does not exist, the Limitless faculty counsels will, by joint vote, approve an internal set of standards for each new subject offered. Student answers will be scored automatically and uploaded into an easily manipulated database viewable by students, teachers, and parents alike.

Akin to Panorama, Limitless will also collect data on feelings towards teachers, administrators, homework, the school, etc. (Manjoo 2014). This data will be available to administrators and probably faculty members. Obviously it would be used to evaluate individual and collective success. Teachers can adjust to shortcomings identified by students and parents (e.g. "I don't feel like this teacher cares for my wellbeing), or if not, then Limitless can fire them. Through committee work, the Limitless community can adjust to schoolwide shortcomings.

Finally, we will collect annual anonymized student data on a range of personal and philosophical issues. The goal is to see whether a Limitless education has any sort of consistent impact on children, and whether we approve or disapprove of that upshot. These questions might include: Do you believe in God? Do you subscribe to a specific religious denomination, and if so, which? Do you think America is a force for good in the world? Do you feel uncomfortable confronting someone when you think they're wrong? And so on. While there may not be a control for comparison, these sorts of studies would still reveal meaningful educational

outcomes. If we consistently produce undesirable qualities, beliefs, or conclusions in children, then we should reevaluate our methods.

*Houses:* For better or worse, humans are pack animals. We naturally fall into tribal mentalities. This is one of the reasons KIPP requires its students to call each other teammates (Coyle 2009, 148). They are on a team vs. the world, with its foregone conclusions about the students based on their zip code.<sup>33</sup> Instead of militating against human nature, Limitless will seek to leverage it in order to foster microcosmic communities within the school.<sup>34</sup>

Upon enrolling at Limitless, every student would be randomly assigned to a house (the number of which is yet to be determined). Students would stay in their house throughout all their years at Limitless, and every division of every school in every region would have the same houses; houses would thus generate logical inter-school connections. Each house would have its own quirks, colors, traditions, and identity. Most importantly, each house would create a sense of belonging. Houses would have dedicated faculty members, and as Paul Tough puts it, there's something powerful when teachers choose a group of students as *theirs* (Tough 2012, 159). Students will be looked after by elders arbitrarily invested in them. And that arbitrary nature means a science student might connect with an art teacher he would have never otherwise met.

The same thinking applies for peers too. It is easy to imagine houses having welcome parties for new students on the first day of school, kindling relationships between upperclassmen and new faces. Your house community—the group you sit with at assembly, play with during intramural sporting events, meet with during homerooms, etc.—would be a fallback throughout your time at Limitless. At Yale, I have seen how this system undermines a proclivity towards

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<sup>33</sup> Or even worse, prison guard unions rooting *for* more delinquents.

<sup>34</sup> Think Yale's residential colleges or Hogwarts's four houses.

cliquishness. There are many pockets of Yale united by interests and activities which I would never enter. Absence from that pocket means I would never meet those kids; I might form generalized, inaccurate conceptions of them as a group; and I would never get to understand their passion or ideas *from their* point of view. The residential college system, though, connects me to people in all sorts of pockets. And through them, I meet their friends, go to their events, and come to better understand the people most unlike me. I can only wish the same for Limitless students.

*Schedules:* Limitless school days will begin at 8:30 am or later, in accord with recommendations by the American Academy of Pediatrics (American Academy of Pediatrics 2014). The relatively late start will aim to combat the chronic sleep deprivation of adolescents, whose circadian rhythm makes it difficult to fall asleep before 11 pm (*Ibid*).

On a more macro level, we will try to avoid “summer slide” by operating year-around. For students, school will be in session for six weeks, followed by a two week vacation. For teachers, this cycle will entail six weeks of classes, one week of professional development, and then one week of vacation. Professional development will revolve around collaboratively analyzing data collected in formative assessments. Which students are falling behind? Are they struggling in just one subject, or is there a sudden holistic drop in all fields, suggesting a problem other than the material? Does a student display the same behavior in everyone’s class? If not, who has figured out how to connect with said student and how? Basically, teachers will collaborate to plan cooperative support and intervention for students. It can also serve as a time to hold faculty counsel meetings. If more traditional professional development is desired (*e.g.* how to best implement some new classroom technology), then that would fit nicely into this week as well.

## Parent Relationships

By and large, parents want to advance their kids' academic pursuits. Due to i) their role as constant guardian and ii) relationship as perpetual mentor, they are uniquely positioned to provide this kind of support. To maximize this potential impact, including parents in the community will be an explicit objective for Limitless.

As discussed, parents will have constant access to data about their child's progress through curricula. They will also have access through a robust visitors' center, stocked with coffee and reading materials, and oriented towards parents (Henderson 2007, 20). Often parents report feeling unwelcome at a school unless they are explicitly invited (*Ibid.*, 34). Thus biweekly school-wide emails, which will share news about Limitless happenings, will also solicit parent involvement. Parents can get involved by communicating with teachers and administrators, participating in the parent advisory counsel, and attending school events, like Trivia Night, the proceeds of which may go towards the budget. This would all be conveyed to parents during the home visit made to every new family.

Teachers especially will be encouraged to connect frequently with parents. Families should be updated at least every month on how their child is performing. If possible, parents should be asked to help their child develop skills in particularly troublesome topics and areas (*Ibid.*, 15). A small request from the school can go a long way. When parents were emailed simple tips how to better read to their children, they spent substantially more time developing students' literacy skills at home (York & Loeb 2014). In a separate study, researchers sent personalized text messages to parents asking them to remind their middle and high schoolers to turn in homework. Homework completion increased by 25%, along with grades and test scores

(Bergman 2014). Although automated and exceptionally inexpensive, these parent contacts can yield big returns.

### **Conclusion**

Needless to say, this is not a comprehensive school plan. Given constraints, I opted for a conceptual sketch. It is my hope that, sometime in the future (with a lot more teaching experience under my belt), I can revisit this paper. I have tried to argue that compelling rationales, scientific and otherwise, suggest the Limitless model (or something like it) would best help students grow into the kind of androgynous learners we all aspire to be. If successful, then Limitless could pave the way for a new cultural script for teaching and learning in America—one that better promotes the longterm flourishing of our students and society.

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