Jal Mehta and Sarah Fine, December 2015, Students at the Centre

In the year 2015, practitioners working in the American public education sphere are tasked with an ever-increasing set of ambitions. Create classrooms that support critical and creative thinking. Focus on 21st-century skills. Cultivate authentic inquiry. Teach reflective habits of mind. Teachers, principals, or district leaders across the country could readily add to this list.

These various ambitions differ in some important ways. At heart, however, they are all rooted in the desire to create formal learning experiences that are powerful and empowering for all students—in other words, *deeper* learning than what most schools have offered most of their charges to date. Calls for this kind of transformation are by no means new, but in recent years they have grown dramatically louder, giving deeper learning-oriented practitioners, policymakers, researchers, and philanthropic organizations a sense of common purpose.

Why are so many convinced that reorganizing schools around deeper learning is particularly critical at this moment in history? To take a wide lens, it is due to the recognition that successfully navigating 21st-century adult life requires far more than basic academic knowledge and skills. This holds true across a range of domains. On the personal front, adults need to be able to navigate among plural identities, to confront complex ethical questions, and to make informed decisions in the face of uncertainty. On the civic front, they need to be able to articulate and advocate for their perspectives, to engage in productive dialogue across ideological divides, and to decide among imperfect options. On the professional front, they need to be able tackle open- ended problems in critical, creative, and collaborative ways, and to engage in ongoing learning that allows them to adapt to the needs of a rapidly changing job market. All of these domains require not only "hard" skills but also the disposition to make use of such skills in an ongoing and context-sensitive way.

Skeptics who take the long view might dismiss this change of focus as yet another swing of the pendulum in an endlessly repeating pattern of ideological shifts. It is certainly true that school reform efforts have tended to cycle back and forth between "basic" and "higher-order" goals. In the 1960s, for example, educators and policymakers talked a great deal about the importance of fostering curiosity and creativity through student-centered instructional practices— only to change their tune as "back to the basics" once again became the mantra in the 1970s. It is also true that this shift, as well as those that preceded it, existed mostly at the level of rhetoric and policymaking; research suggests that teaching practice in classrooms has remained fairly stable over time, with a majority of classrooms remaining teacher-centric, and with teachers focusing more on surface-level knowledge rather than deep understandings. Suffice it to say that if one takes the long view it is all too easy to argue that the recent calls for deeper learning are unlikely to gain long-term traction.

There is no consensus on exactly how to define deeper learning. One prominent definition argues that deeper learning results when learners are able to develop significant understanding of core academic content, exhibit critical thinking and problem-solving, collaborate, communicate, direct their own learning. Our research has led us to emphasize a related approach that suggests that deeper learning often emerges at the intersection of mastery, identity, and creativity. In particular, we think that three kinds of integrations are important for understanding deeper learning: the cognitive and the affective, the short-term and the long-term, and the individual and the social.

To begin at the beginning: What does it mean to understand something deeply? Cognitive scientists think of deep learning—or what they might call *learning for understanding*—as the ability to *transfer* knowledge. The idea here is that knowledge becomes deeper when you can use it not only to address a problem in the context in which it has been taught, but that you can also use it to understand or explain something in a different, but related, context. Research suggests that deep learners have schemas that enable them to see how discrete pieces of knowledge in a domain are connected; rather than seeing isolated facts, they see patterns and connections because they understand the underlying structures of the domain they are exploring. For example, a shallow understanding of the biological cell might enable one to label its parts; a deep understanding would enable one to understand how a cell's components function together as a system, and thus what might be expected to happen if a particular component were damaged.

This example brings to the fore another aspect of deep understanding: it requires both a significant repository of factual knowledge and the ability to use that factual knowledge to develop interpretations, arguments, and conclusions. While "deeper learning" is sometimes critiqued as the latest round of favouring "skills" over "content" or "concepts" over "facts," research is clear that people who possess deep understandings of a domain move with ease across this false divide. The ability to offer an historical interpretation of the causes or consequences of the French revolution, for example, is rooted both in detailed knowledge of the key players, structures, and events and in knowledge of how to draw inferences, construct historical arguments, and use evidence to support one's point.

Much of the work in this cognitive tradition draws its inspiration from research on expertise, which explores how people who are widely seen as experts in a field construct their understandings. Studies of such experts reveal that they notice aspects of a situation that are not apparent to non-experts because they have cognitive schemas for understanding the domain; for example, expert teachers are more able to assess and respond to students' thinking and adapt lessons midstream than are novice teachers, who tend to proceed more mechanically through more subject- centered lessons. This idea relates to Bruner's (1960) notion that to truly understand a domain requires understanding the structure of how that field organizes its knowledge. This kind of epistemological understanding, he argues, is critical to building the conceptual schemas that enables transfer within a domain.

Missing from these accounts of what it would mean to deeply understand something are the reasons why someone would seek such understanding in the first place. Our experiences in observing, teaching, and learning in powerful classrooms suggest that the "cool" descriptions of the cognitive dimensions described above are married to "warmer" qualities such as passion, interest, and "flow"—qualities that give the learning life and create forward momentum. Studies show that the longer students have been in school, the more their levels of reported engagement decreases, which is a very worrying sign for those seeking to promote highly engaged learning in formal education settings. From this vantage point, the goals in pursuing deeper learning need to connect building understanding with motivating interest, as it is this combination, that will yield the kind of virtuous cycle that will build toward deeper learning.

This synthetic perspective is given a boost from retrospective studies of deep learners. This work looks at individuals who have become deeply knowledgeable and skilled in their domains and asks them how they arrived where they did. The general pattern is that people initially become interested in their domains by playing around in those fields (e.g., splashing in a pool or experimenting with a musical instrument); then they begin to engage in deliberate practice under the supervision of a coach or someone with more experience in the domain; their identities gradually shift to reflect their participation in the domain (from "I'm someone who swims" to "I'm a swimmer"); they continue to practice; and then eventually "play" and "creation" re-emerge, this time in a much more complex way. We could think of this process as a kind of spiral, in which one returns again and again to the same activities, but each time in a way that is more sophisticated.

This account of how *individuals* become deep learners is complemented by work that emphasizes the role that *communities* can play in this process. To that end, Lave and Wenger (1991) suggest that much of the most powerful learning takes place in communities of practice; these are fields (like midwifery, sculpting, butchering) in which one begins as a "legitimate peripheral participant" (e.g., an assistant to a midwife) and through the process of observation, modeling, and emulation, one is gradually apprenticed into understanding and skills in the domain.

Collins, Brown, and Newman (1989) have applied similar insights to more classically academic subjects in their argument for "cognitive apprenticeship," in which skilled readers, writers, and mathematicians gradually induct less expert members into their crafts. Such a process bring together many elements that are hypothesized to be important for deep learning: the field sets a standard for what good work looks like; there is a significant role for coaching, modeling, and feedback; the desire to do what leading practitioners do provides direction and motivation; and the task is grounded in a human activity which has intrinsic value. The image of moving from a "peripheral participant" to a more central one is also consistent with the language of increasing "depth"; from this perspective, deepening one's learning in a given domain happens in part by becoming more centrally enmeshed in a domain-specific community, which links one's individual growth with one's social position. It also suggests a shift in role from passive observer to active participant.

Finally, there are the perspectives that have emerged out of our observations of deeper learning classrooms across the nation. While their goals may be quite various (disciplinary understanding, interdisciplinary problem-solving, experiential learning), the *qualities* of these classrooms tended to be quite similar. They were environments where learning often took on characteristics of "flow"; the challenge of working at the edge of their knowledge and skills led students to become deeply absorbed. By the same token, this learning involved grappling with uncertainty, ambiguity, and the real possibility of failure. The motivation to persevere through such obstacles was rooted in the

intellectual vitality that characterized these classrooms as a whole—the intangible quality, which infused the work with meaning and momentum

Taken together, we suggest that deeper learning often emerges at the intersection of the following three elements: *mastery, identity, and creativity.*

- *Mastery* captures the dimensions of deeper learning that are tied to knowledge of substantive content, transfer, pattern recognition and expertise, and understanding the structure of a field or discipline.
- *Identity* captures the way in which deeper learning generally is driven by intrinsic motivation, how it is fueled by learners' perceptions about the relevance of the content, and by the way that learning becomes deeper as it becomes a more core part of the self.
- *Creativity* captures the shift from receiving the accumulated knowledge of a subject or domain to being able to *act* or *make* something within the field; taking this step builds upon understanding a domain (e.g., analyzing how a play is written) and incorporates it into a creative act (e.g., writing an original play).

Seen this way, aspirations for deeper learning pose a multi-pronged challenge to current practice. At minimum, they suggest the importance of a long-called-for but thus far unachieved increase in the cognitive demand of the tasks that most students, particularly high-poverty students, are asked to complete. From this vantage point, the kind of rigor present in the Common Core and related assessments is a critical step for realizing deeper learning because those standards increasingly call for fewer topics, more depth on each topic, and more opportunities to integrate knowledge and make conceptual connections than previously has been the case. More radically, some advocates of deeper learning are questioning many of the industrial-age structures that organize today's classrooms.

From this perspective, a commitment to deeper learning would entail a shift from disciplinary-specific age-graded classrooms based on teaching units and seat time toward a system that is more interdisciplinary, problem-based, and organized around demonstrations of mastery. Metaphors of coach and producer would replace teacher and student, and there would be many opportunities for such "producers" to become part of different kinds of communities that would gradually induct them into more sophisticated levels of work. In either of these conceptions, a serious commitment to deeper learning would require a significant departure from current practice, and particularly for the practices that tend to characterize instruction in schools and classrooms serving disadvantaged and minority students.

Throughout history, the dividing lines of race and class have played a critical role in who has had access to deeper learning experiences. Faced with massive immigration and a rapidly growing high school population at the beginning of the 20th century, reformers built a school system that created different pathways for students of different ability and/or family background. Emboldened by the then-new science of intelligence testing, these reformers created an explicitly differentiated school system, which funneled more advantaged students into fairly rigorous academic tracks and poorer and working class students into much less academically demanding tracks. The result, according to both quantitative evidence and closely observed ethnographies of classrooms, is that schools and tracks that serve upper middle class students more frequently feature interactions where students are given ample opportunities to express their thinking and grapple with complex or open-ended questions, whereas schools or classes serving working class or high-poverty students tend to be dominated by teacher talk and feature worksheets and other low-level tasks. Thus, while the overall enthusiasm for progressive or inquiry-oriented education has waxed and waned across decades, to the degree that it has been taken up, it has frequently been for the most advantaged students.

History also underscores perhaps the most important reason why there has not been more deep learning in American schools: limited public demand for it. The qualities associated with deep learning—critical thinking, grappling with nuance and complexity, questioning authority, and embracing intellectual questions—are not ones that are widely embraced by the American people. For example, the 1960's National Science Foundation curriculum, Man: A Course of Study (MACOS), which invited students to study another culture as part of an anthropological examination of what it means to be human, died at the hands of a fundamentalist backlash. MACOS is just one example among many of the ways in which efforts to have students ask difficult questions have been rebuffed by a more conservative electorate. It is perhaps not surprising that the examples we do have of deeper learning tend to involve niches of interested students, supportive parents, and teachers who are willing and able to teach in such environments. Attempting to expand these niches to the whole would require a seismic shift.

Four years ago, the two of us set out to "map the landscape" of non-elite public high schools that are enacting deeper learning for all of their students. Our plan was to use our professional networks to identify a range of such places and then to immerse ourselves in them, studying their work using ethnographic methods and emerging with sparkling case studies to inspire and guide others in the field. When we described the work to others, we referred to it as an antidote to the often negative portrayals of schools, calling it by turns the "good schools beyond test scores" project and the "varieties of excellent schooling"

Twelve months later found us in a very different state of mind. As planned, we had solicited names of leading non-élite deeper learning high schools from an array of stakeholders in the field: teachers, parents, school and district leaders, policymakers, foundation heads, and researchers. We had driven and flown to see those that consistently were recommended. At school after school, however—including at many of the places included in the Hewlett deeper learning network—we found that as we shadowed students throughout their days, there were startling gaps between aspirations and realities. Most classrooms were spaces to passively sit and listen. Most academic work was comprised of tasks that asked students to recall or minimally apply what they had been told. Even in schools that actively were striving to organize instruction around authentic tasks, when we asked students about the purpose of what they were doing, the most common responses were "I dunno—the teacher told us to," and "I guess it might help me in college." We had hoped to be inspired but instead we felt profoundly disheartened. Perhaps we should not have been surprised; even at these recommended schools, what we saw was consistent with the history of curriculum change as well as with more recent quantitative assessments of classroom practice.

A central part of the problem, we came to think, was that schools on the whole do not have the mechanisms to translate their espoused values to their enacted practices. This underscores one of the key findings that emerged from our project: it is not simply the "containers" of the work that allow a given school to translate its aspirations into consistently powerful teaching and learning. Just as two teachers teaching the same curriculum to the same level of students in the context of the same school community can diverge dramatically in their instructional prowess, so too can schools pursuing similar goals using similar theories of action part ways in terms of the quality and consistency of the learning they produce. This holds true even for schools whose structures reflect a particularly innovative or student-centered vision; our work suggests that it is by creating dense and mutually supportive connections among elements such as curriculum, assessment, pedagogy, school culture, and teacher learning, rather than by merely adopting a promising framework, that some such schools are able to make headway while others struggle to create any kind of consistent depth from classroom to classroom.

This is not to say that we did not encounter any deep learning at all. To the contrary, even in the schools that had made the least amount of headway as whole institutions, we found *individual classrooms* that were joyful, engaging, and/or intellectually rich places to teach and learn. In a few cases, we found entire departments and programs that consistently embodied some or all of these qualities. And, among the 30 schools that we visited in total, we did encounter a few that were moving toward the consistent depth that we sought at the outset—though even those were still somewhat uneven from classroom to classroom. Finally, it is worth noting that while the main focus of our work was on high schools, we did visit a handful of elementary schools as well, and on the whole they embodied many more of the qualities that deeper learning advocates aspire to: a commitment to leveraging students' natural curiosities into learning, an emphasis on active thinking and reasoning, and an overall sense of warmth. This is not to say that deep learning was present in every classroom, but rather that the structures and values characterizing elementary school teaching tended to be more promising than those of their secondary counterparts.

As we tried to come to terms with what we were seeing, the stance of the project began to shift. By synthesizing the glimmers and glimpses of deep learning that we encountered in the field with the existing research literature, we identified the elements of the deeper learning triangle described above: mastery, identity, and creativity. A large number of such schools, we realized, can be clustered into rough groups that share a set of underlying values as well as a theory of action about how these values can be instantiated through organizational structures and classroom pedagogy.

For example, a number of the schools and networks in the Hewlett deeper learning network share an aspiration to support students in developing the kinds of general competencies that Wagner (2008) describes as the "seven survival skills" necessary for the 21st century. These schools emphasize the development of original work through engagement in interdisciplinary, collaborative, real-world-aligned projects—a model that often entails block scheduling, cross-subject teaching, and the use of performance or portfolio-based assessments. We see these schools as sitting closer to the *creativity* node of the deeper learning triangle with respect to their aspirations.

A second group of schools sits much closer to the *mastery* node of the triangle, organizing themselves around the goal of supporting students in developing deep knowledge, skills, and competencies within the traditional academic disciplines. These schools, which include some that have adopted the International Baccalaureate (IB) program, and a few that have developed their own inquiry- based approaches, aspire to help students learn to do what Perkins (2010) calls "playing the whole game" of the traditional academic disciplines—not just superficially to learn about historical events, for example, but to emulate the processes of historical inquiry through analyzing primary sources, debating competing interpretations, and conducting original research. Schools which are organized around the International Baccalaureate program are trying even to go one step further than this, striving to help students understand how the core "ways of knowing" of each discipline compare to and differ from others.

A third group, which notably includes schools in the Big Picture Learning Network and the New York City I-School, focused more on the *identity* node of the deeper learning triangle, striving to help students develop a stronger sense of themselves as learners, citizens, and soon-to-be professionals by offering them ongoing opportunities to learn from out-of-school mentors and extensive choices in terms of their in-school course of study. These schools tend to bank heavily on structures that support individualized pathways toward graduation: online courses, student- chosen internships, elective courses, and "looping" advisories.

Of course, to describe schools by their central tendencies ignores that a number of schools aspired to multiple priorities. But, overall, we were struck by the difficulty of finding the sweet spot—looking across these schools was like looking at a microcosm of the historical debates between progressive and traditional forms of education. Specifically, the schools that were more progressive sometimes struggled to ensure that students consistently mastered basic academic content, whereas the more traditionally academic schools struggled to make their material authentic and connected to students' interests.

The bad news coming out of our study, then, is that field is not as far along as some accounts might suggest when it comes to enacting deeper learning at the whole-school level. The good news is that such learning is happening *somewhere* in virtually every school that we visited— including schools that were heavily focused on standardized testing and schools that had made no commitments to deeper learning whatsoever. This became a predictable dimension of our work: we knew that if we shadowed a given student over the course of their six-period day we inevitably would encounter one or perhaps two standout practitioners who had figured out how to infuse their classrooms with rigor and vitality. This finding is consistent with the Gates Foundation Measures of Effective Teaching study, which estimates that one out of every five classrooms features at least a moderate amount of critical and/or creative thinking. This statistic can be seen as disheartening—only one in five!—but it also can be construed as a source for hope.

> *While the case for deeper learning is clear, it is similarly apparent that the industrial age architecture inherited from the early 20th century needs to be re-envisioned if we are to make headway. We will highlight some of the major dimensions that need to change and describe how existing assets could support those shifts.*

The first and most basic change needs to come in what we ask of students. By all accounts, the cognitive tasks posed to students are, on average, neither cognitively challenging nor personally engaging. The Common Core State Standards and its aligned assessments are one possible lever for making such a shift. In turn, these changes need to be supported by substantial changes in the nature of curriculum; at the moment there is a rush to stamp "common core aligned" on to existing materials without making substantive changes to what students study and what they are asked to do with it. We need both reliable mechanisms for sorting new materials, and new materials, which are developed with teachers that would support the more ambitious goals of the Common Core.

Of course, increasing disciplinary rigor is only one vision of what it might mean to engage all students in challenging, meaningful, work. Many deeper learning advocates are calling for reformers to rethink the underlying nature of academic curricula, with the goal of moving away from disciplinary silos and toward more integrated problem-based investigations. In this vision, the key questions and problems that confront 21st-century adults necessarily cross disciplines; thus, being an informed citizen and critical thinker means being able to grapple with these difficult questions. Disciplinary knowledge is integral to addressing these questions, but the questions themselves draw their authenticity and power by being rooted in the world. For example, a teaching team in one school that is organized along these lines asked sixth grade students to brainstorm questions they had about the world and themselves. Students organized these questions into categories, and then developed a single essential question. The students chose the rather macabre: "How might the world come to an end?" Students then worked in teams to research different possibilities—famine, nuclear war, infectious disease, among others—and then they each presented these possibilities in a culminating symposium to a mixed group of parents and community members. Problems like this draw on adolescents' intrinsic interests and curiosities, and then use those as a way to connect to different parts of the web of knowledge.

This more problem and project-based vision might also imply more significant changes in the social organization of schools and the policies that govern them. Problem and project-based work generally require longer blocks, enabling students to go through the process of grappling with difficult questions, experiencing dead-ends, and eventually finding workable approaches. With longer blocks also come fewer subjects in the course of a given day; it is hard to imagine that if we were starting from scratch and aiming for "deep learning" we would embrace a schedule of students having six to seven 50-minute blocks to study different subjects.

Making these changes in learning experiences for students will also require significant learning on the part of adults. The most important priority, by far, in creating a system that would support deeper learning is to develop teachers and leaders who themselves have experienced some version of deep learning, and to give them opportunities to continue to grow and extend this practice. Achieving this would in turn require changes at every stage of the teacher pipeline. The selection of new teachers would need to be more stringent. Learning how to teach would need to become much more intentional; new teachers would need to see and have named for them the various elements and routines that are part of ambitious teaching. Prospective teachers would also need significant immersion in deeper learning environments, places that routinely demonstrated in their daily practice what it is that teachers are trying to achieve. We should work to incentivize the best of traditional public schools to take on mentoring and training of new teachers; we also should draw on leading schools to serve as incubators for new deeper learning teachers. We also might have new teachers rotate through other types of learning environments—Montessori schools, architectural design studios, conservatories, theatre troupes—to expand their vision of the different ways that learners can be inducted into their fields.

Changes in preparation need to be accompanied by changes in opportunities for adult learning in schools. To become spaces that foster deep learning for teachers and administrators, schools will need to make structural changes as well as institute more intentional designs around adult learning. Teachers need more time to collaborate, and this time must be used in ways that are anchored unequivocally in their schools' pedagogical visions. Research is unequivocal that teachers learn best when they are working on a problem of practice, with colleagues, that relates to their students; schools need to establish the routines and protocols, and most importantly the culture, which can support this ongoing examination of practice. The most important people in developing such a culture are principals, who thus also need to have had deeper learning experiences that play a critical role in guiding them as they develop the structures, processes, and culture that can support deeper learning in their schools.

Part of the challenge here is that moving toward deep learning will require *unlearning* for many practitioners. As the goals for instruction move from procedural and algorithmic to more conceptual and open-ended, teachers will need both to learn new content knowledge and to develop different teaching strategies. Making this kind of a shift requires considerable skill and expertise on the part of instructional leaders (including master teachers, coaches, and principals), who need to demonstrate the values of new modes of instruction, model new practices, create opportunities for teachers to take risks, and establish environments which normalize failure as a necessary part of learning. These are many of the same characteristics we are seeking for students; thus, creating such environments for teacher learning would create system-wide *symmetry*.

In order to support this kind of adult learning at the school level, accountability and assessment systems would need to shift. The current focus on high- stakes individual teacher evaluation is counterproductive in three keys respects: it focuses narrowly on performance on state-administered tests in reading and math; it places the onus of improvement on individual teachers rather than on schools as whole organizations; and it discourages the kind of experimentation and unlearning that real change requires.

Adaptive learning also entails loss; people have to give up some of what they value and know in order to make room for something new. In this case, teachers will need to re-imagine how they teach; education schools will need to fight university imperatives that pull them away from practice and become more focused on carefully guiding their charges toward deeper learning; K-12 schools will need to resist the urge (and incentive) to measure their success by how much they cover; and districts and states will need to fight the desire to control teachers and schools and focus instead on supporting them as learners. None of these changes will be easy to enact, and, given the inertial pull of history. And yet, there are reasons to think that it can and will come to pass. Foremost among them are the economic imperatives—for most of American history, graduating from high school would secure you a middle class living, regardless of how much you have learned. This is no longer the case, which radically changes the incentives for both parents and students in how they approach schooling.

Then there are technological changes. We currently have what Elmore has described as a "portal" view of schooling: states, and then districts, and then schools make decisions about how to carve up the skein of knowledge, and the result is what a student receives in biology at 10 a.m. on Thursday. But everything ever known about biology is sitting on the student's phone. At some point, you would have to think, we will shift to a world that is directed more by students' interests, where teachers scaffold student learning, yes, but students' profit by directly engaging with the limitless information and resources available on almost any topic.

Finally, there is the fact that deeper learning is *captivating*. Hard to achieve, yes, but once you've experienced it, shallower learning looks like black and white compared to full-spectrum colour. Change will be slow, and it may take several generations, but deeper learning can spread gradually, as each one teaches one until we live in a world in which all students experience an education of power and consequence.