



Teaching differently Learning deeply

High Tech High follows a concept of project-based and technology-supported learning in San Diego that leads students to a different kind of learning.

By Jal Mehta and Sarah Fine

It is 11 a.m. at High Tech High in San Diego, and Davon and Isabel are working at the back of a classroom. Isabel, a Mexican-American 10th grader, leans over a magazine article about teen pregnancy. Her face registers something between interest and confusion as she pauses to reread a paragraph. “I think we should include this,” she says quietly in Davon’s direction.

Davon, Isabel’s project partner, appears at first not to hear. Black, tall, and wearing calf-high combat boots, he is as flamboyant as Isabel is soft-spoken. He sprawls in a metal chair and looks sidelong at a partially finished interview transcription on a laptop. After a moment, he trains his gaze on his partner. “What’d you find?” he asks. “We definitely need more statistics.”

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The two are making a video documentary that argues for distribution of contraceptives at high schools, and they're about halfway through writing their script. The 12-week project was developed by Mr. Quinn, an energetic English teacher in his seventh year of teaching. At the beginning of the process, the students studied fear-based rhetoric, focusing on McCarthyism during the Cold War. They then formed groups and began working on the project's performance task, a documentary that uses the "paranoid style." To fulfill the requirements, each group must choose and research a topic, write an informative memo and an argumentative essay about it, conduct filmed interviews with stakeholders, draft and revise a script, and produce the movie itself. Finally, students have to add music and Spanish subtitles to their film before screening it for teachers, parents, and peers at the class exhibition night.

It is no accident that Isabel and Davon chose to be partners. Their collaboration reflects the intimacy

of close friends: Periods of comfortable silence are punctuated by serious dialogue as well as by squabbles and play. When Davon comes back from an extended trip to the bathroom, Isabel chides him, warning him that they might need to work through lunch in order to meet the end-of-day deadline. "No way, girl," Davon counters. "I'm going to get this transcription done in a *snap*."

Around the room, other groups are working with similar self-direction. Some students sit on top of tables discussing their ideas; others float in and out of the room carrying video cameras. A group of girls confers about the sequencing of images in their film, moving seamlessly between working and socializing.

In contrast to a conventional teacher-centered classroom, it is at first difficult to locate the teacher. Mr. Quinn's presence in the room is energetic but understated. He spends most of his time sitting with groups, listening to their conversations and asking probing questions. He allows students to make their own decisions about task division and time use, but, when he senses that a group is getting off-track, he directs them to useful resources. With one group of highly skilled students, he reminds them in passing that he expects "nothing less than perfection"; with Isabel, he's gentle and more actively supportive, affirming her decision to open the film with one of the statistics she discovered. He and his students seem profoundly comfortable with each other; many groups linger in the classroom even after the clock has signaled the start of lunch.

A 21st-century school

The Gary and Jeri-Ann Jacobs High Tech High opened in 2000 as part of an initiative by business leaders frustrated by the lack of workers qualified to meet the demands of the 21st-century economy. It is the founding campus of what now has become a network of 11 charter schools in the San Diego area that have diverse student bodies. They all follow a project-based model of instruction that strives to integrate technical elements with a liberal arts curriculum. Although the school has not been rigorously evaluated, the *prima facie* evidence is impressive. The schools have done well on a variety of measures: 100% of their graduates have been accepted to four-year colleges, including the roughly 35% of their students who are the first in their families to go to college, and the 37% who qualify for free and reduced-price lunch. According to National Student Clearinghouse data provided by High Tech High, 77% of their graduates have finished or are currently enrolled in postsecondary education, including 69% of students who were the first in their family to go to college, and 67% of students who qualified for free or reduced-price lunch. The Jacobs' campus also scores in the top 20% of schools

in the state on California's Academic Performance Index, a composite measure of test scores. Given this success, hundreds of students from a wide range of backgrounds apply for relatively few slots. Beyond this, many of the school's faculty members and administrators enroll their own children in the system — a sign of a healthy community.

In many ways, the approach to teaching and learning at High Tech High is as forward looking as the school's name implies. The paranoid-style project is not an exception. Across the school, students are engaged in tasks that require them to explore and leverage the possibilities offered by new technologies. For example, in a biology project, students created digital curriculum materials, including instructional videos to support the teaching of specific laboratory experiments. After presenting their videos to a class at San Diego High School, students uploaded these materials onto an open-source web site to be used by biology teachers across the country. In another project, students combined calculus and carpentry to design, build, and market "bentwood" chairs, using Adobe Illustrator to create marketing campaigns and blogging about their work along the way.

High Tech High even *looks* innovative. The building, which used to be a naval training center, feels like a cross between a technology startup and a science museum. High ceilings with exposed pipes offset the glass panels that separate classrooms from central areas. Many rooms have sliding dividers, and most have desktop computers lining the walls. Student work seems to cover every surface of the building's interior. In the area near the main entrance, there is a 10-foot-high set of interlinked bicycle wheels, a playground-size suspension bridge, and a TV screen playing a looped video on the properties of light. Nothing gets old. Every few years, the seniors whitewash the many murals to make room for more current work.

Impressive technology, and more . . .

Attributing High Tech High's success to its visibly high-tech elements would be easy. Without the school's desktop and laptop computers, robotics lab, audiovisual equipment, and powerful schoolwide server, teachers wouldn't be able to engage students in the kinds of projects described above. However, as wise researchers and policy makers have long recognized, the presence of technology is no guarantee of meaningful improvement in teaching and learning. All too many schools have invested heavily in interactive whiteboards, laptops, and multimedia centers but have seen only superficial changes in practice or outcomes.

What, then, is High Tech High doing differently? The answer lies less in technology than in a different vision of schooling from what prevails today.

The logic that governs much recent school reform runs as follows: The primary goal of schooling is to prepare students for success in college and the workplace beyond; tests provide interim measures of how likely students are to succeed at these life milestones; and, therefore, a good school is one in which students pass tests in large numbers. This logic is appealingly straightforward, especially if the tests in question measure something meaningful, but it values what students will become in the future more than who they are in the present. Schooling is conceived as a means to an end; the real work begins after graduation.

The life unfolding in High Tech High's classrooms suggests a much more ambitious vision. Students are treated as active meaning makers with the capacity to do interesting and valuable work *now*. To engage with a subject, in this view, is not simply to receive knowledge but also to create it, mirroring the adult world of historians, movie producers, and other creative professionals. Accordingly, the purpose of school is not so much to prepare students for a hypothetical future as to support them in engaging with the complex challenges that professional work at its best entails. The approach is rooted in a profound respect for who students are and what they can do.

Organizing a school around this vision has a number of advantages. Motivationally, it proves more appealing to students than the future-oriented view; they engage in the work of projects not only because doing so might help them in college but also because they are genuinely interested in what they can produce at their best. Academically, it asks students to move beyond basic comprehension and algorithmic procedures to engage in skills that lie at the top of traditional learning taxonomies — analysis, synthesis, and creation. Organizationally, it contains a powerful form of school-level accountability: When students present their projects at public exhibition nights, it is abundantly clear whether they and their teachers have achieved the kind of deep learning to which the school aspires, and when they have fallen short.

A different approach

Achieving this big-picture vision requires teachers at High Tech High to reimagine the day-to-day process of teaching and learning. As the scene from Mr. Quinn's project illustrates, the life unfolding in the school's classrooms looks quite different from what one usually encounters in American high schools. Specifically, there are key differences in each dimension of the instructional triangle — differences in the tasks around which learning is organized, differences in the roles that students are asked to take on, and differences in how teachers support the learning process.

Tasks — In comparison to traditional high schools, High Tech High engages students in tasks that are more open-ended, complex, self-directed, and sustained. A long and rich research literature points out that academic work in most American high schools tends to be closed-ended: There is an answer, the teacher knows it, and students are guided toward it. One illustration of this paradigm is the conventional science lab. Teachers ask students to follow a set of predetermined procedures to produce a reaction that both the teacher and students know is coming. By contrast, at High Tech High there is no clear answer. The teacher doesn't know what students will produce, and students are responsible for navigating their way forward. There are plenty of parameters that include descriptions of the work to be completed, graded milestones, and assessment rubrics, but there is no single best or right way to complete a given project. Further, while many schools encourage teachers to divide lessons into short, time-bound chunks to increase time on task, High Tech High has self-consciously taken the opposite approach. Projects unfold over months and, at any given time, students are working toward goals that might take hours or even days to attain. The atmosphere in such a setting is intellectually serious but fluid: There is a constant ebb and flow of productivity during the day, and the line between on task and off task work is often blurry.

Students — Working on such sustained and open-ended tasks requires students to develop different skills than they would in more conventional schools. Projects like the paranoid-style documentary tap students' interests and give them the sense of accomplishment that comes from working long and hard on difficult problems. However, these tasks also entail considerable uncertainty, as well as the very real possibility of public failure. Accordingly, students need to learn to persist, to think flexibly, to be comfortable with ambiguity, to manage their time well, and to accept disappointments along with triumphs — all of which require an emotional maturity that even many adults find difficult. Teachers at High Tech High recognize these challenges and support students by breaking projects into parts, dividing students into groups, building in regular opportunities for students to reflect on their process, and providing substantive guidance when appropriate. Most of all, the school as a whole strives to create a relaxed and positive culture where uncertainty, ambiguity, and dead ends are understood as normal parts of the process of producing good work.

Teachers — Perhaps the greatest challenge of this vision lies in what it asks of teachers. Helping students work in the above ways requires significant technical skill, as well as a willingness to invert traditional views about the teacher's role and the learner's rela-

tionship to knowledge. Pedagogically, as Mr. Quinn and many of his colleagues report, developing and managing good projects is a complicated balancing act. The central challenge is that projects need to move along a clear trajectory, building in complexity and depth over time while also remaining student-centered. There needs to be a balance of freedom and structure, improvisation and planning, ambiguity and clarity. Teachers manage these dilemmas by breaking projects into manageable but meaningful pieces, modeling the skills that lie at the heart of the work, and being specific about shared content while empowering students to engage learning in different ways.

Beyond specific skills, this kind of work requires teachers to embrace a different idea about what it means to teach. Our culture tends to think of teachers as content experts who deliver knowledge to those who know less than they do. To some, having teachers take on the role of coach, guide, or facilitator seems equivalent to asking them to abandon their primary responsibilities. Organizing instruction around open-ended tasks also risks exposing what teachers do not know, because, as one loosens controls, students are increasingly likely to venture into unfamiliar territory. The teacher's primary task becomes helping students explore the unknown, leaving behind the security and certainty of being the one who defines the questions and knows the answers.

Underpinning this approach is a different view of knowledge and students' relationship to it. Rather than seeing knowledge as something pre-existing that can be transmitted as a whole, this vision holds knowledge to be provisional and imagines students as active participants in its development. To teach with this view in mind requires that teachers not only think *in* a discipline but think *about* a discipline — to think about how knowledge in a field is created and discovered, and to invite students into the process of doing that work. We can see this in Mr. Quinn's paranoid-style project. The stance of the project brings students into the world of historical interpretation. They learn not only about the Cold War but also about a particular way in which Cold War rhetoric was mobilized. Then, they apply this approach to contemporary topics about which they care. This method requires teachers to know their subjects, understand how knowledge is structured, and also know how to help students navigate across conceptual layers.

Conclusion

What is distinctive about High Tech High is not the presence of 21st-century technology, but the reimagining of schooling's purpose and processes. In many ways, however, what High Tech High is doing is nothing new. Rather, the school is bring-

ing the best version of progressive education into the present. It was a full century ago, after all, that John Dewey argued that schools should be places where students completed real work — work that had both imaginative and substantive meaning, that leveraged natural curiosities into deep learning, and that built the inter- and intra-personal skills required for successful participation in social, economic, and civic life. These ideas have received renewed and broadened interest as the public has come to realize that modern workplaces increasingly require skills such as collaboration and creative problem solving.

However, the approach to teaching and learning that we have described is still very rare in American public education. We came to High Tech High as part of a national study we're conducting on nonelite high schools that organize their work around goals of deeper learning — a shorthand term for the skills, understandings, and dispositions that develop as a result of engaging in cognitively ambitious tasks. What we've seen so far suggests the magnitude of the challenge involved in such work. Even among schools specifically recommended because of their focus on critical thinking, we've observed students consistently engaged in ambitious work in only about one in five classrooms. Our experience is corroborated by quantitative evidence from the Bill & Melinda Gates Foundation's Measures of Effective Teaching study, which suggests that teachers are successfully engaging students in ambitious instruction in less than 20% of thousands of sampled classroom.

The education landscape has been shifting a great deal of late. In statehouses and district offices around the country, there is increasing support for the idea that the next level of work for American schools involves focusing on rigorous 21st-century skills. In auditoriums and classrooms, teachers have begun to think about how to align their work with the Common Core State Standards, which place an unprecedented emphasis on critical thinking. These shifts make it especially critical that schools think deeply about how to organize for more ambitious instruction.

It is here that High Tech High's story comes into play. While not all schools will follow High Tech High's path, the school illustrates that enacting more ambitious instruction requires substantive shifts on multiple fronts: different kinds of tasks, different roles for students, and a different vision of what it means to teach. This is a change in kind, not in degree. It will require new methods of assessing schools, new ways of teaching teachers, and a concerted effort to convince the public that a new vision of schooling is needed. While these changes will be hard, they are well worth undertaking — not only for the sake of our students' futures but also for what our schools themselves could become. **K**

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