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Born to Science

A majority of high school students occupying the stratosphere of America's science and math competitions are the children of immigrants. Among them is June-Ho Kim.

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On an overcast Sunday afternoon last month, a crowd of teenagers and their families file through the front gates of Great America theme park, located along a boulevard in the polished suburban circuitry of Silicon Valley. Some of the visitors halt, then press forward past souvenir stands and spiraling roller coasters, unsure where to go next. Emerging briskly from this migration of bodies onto the steps of the park auditorium, flanked by his mother and father, is a smartly dressed though otherwise inconspicuous young man named June-Ho Kim.

June-Ho Kim, center, laughs along with others during a panel discussion at the Intel International Science and Engineering Fair in Phoenix.
—Photo by Tom Story for Education Week

Kim and others have come for a ceremony hosted by the software-design company Synopsys Inc. to honor students' science and technology projects from the Santa Clara County region. Awards are handed out by science discipline and professional sponsor, from societies of vitro biologists and vacuum makers, associations of animal scientists and clinical chemists, air-conditioning engineers, food technologists, solid-waste managers, even the U.S. Navy.

These student projects go far beyond the test-tube-and-rubber-stopper variety. "Got Isoniazid?" is one entry's title. "Moringa Oleifera: Nature's Coagulant" is another.

Yet even among this assembly of talent, the name June-Ho Kim carries some heft. His project, a study of T-cell responses and antibodies connected to multiple sclerosis, is up for several awards, including the grand prize. Before the event, when a visitor asks an adult volunteer at the registration booth if she

knows Kim, she responds without hesitation: “Oh, yes, we all do. He’s extraordinary. And he has a great project.”

As he enters the Paramount Theatre, Kim, 18, smiles and nods to a few friends. “Look, it’s June-Ho!” one teenage girl exclaims.

Kim, from the nearby town of Cupertino, is accustomed to the attention. Just a month earlier, he was recognized as one of 40 finalists for the Intel Science Talent Search, billed as the nation’s oldest and most prestigious precollegiate science competition, and a veritable high school yearbook of future Nobel laureates and National Medal of Science winners.

June-Ho Kim studies physics at the dining room table in his family's Cupertino, Calif., home. A multiple prizewinner in science, the senior is Harvard-bound come fall.
—Photo by Jon Manlove for Education Week

Kim’s ascension into that elite sphere came about the way it did for many of his peers at Intel and other competitions: through a combination of raw intellect and hours of hard work, from grade school on up. But he shares another characteristic with many of the nation’s top math and science students. His parents immigrated to the United States in search of better educational and professional opportunities.

The foreign heritage of those teenagers was explored last year in a study that found they made up a majority of the nation’s top science and math students, as judged by the finalists at Intel and the U.S. Math Olympiad. That study also warned that the spigot of talent could dry up if relatively restrictive immigration polices adopted since the Sept. 11, 2001, terrorist attacks were not modified—a concern echoed by numerous scientists and public officials.

Even at a regional showcase like the Synopsys competition, the contributions of immigrant parents are obvious, several observers say. Those mothers and fathers include the Kims, who after a quick search, find seats in the auditorium, a sloping field of seats descending to a lighted stage. Youngbae, June-Ho’s father, an engineer who moved to the United States from South Korea 19 years ago, readies a hand-held camera. His wife, Jiyeon, and June-Ho settle in to his left.

The murmur of voices gradually fades, and a quiet anxiety envelops the crowd. The event begins with a speech from an IBM researcher whose past work includes projects in such disparate areas as video-game design and auto safety. It’s the sort of career hopscotch that would appeal to June-Ho Kim, whose passion is biology but whose interests skip from medicine to neuroscience to academic research.

Over the years, Kim has heard the stereotype of immigrant families trying to direct their children’s every educational and professional move. His mother and father, he says, offered a far more opened-ended form of encouragement.

“They did want me to succeed,” Kim says after the awards show. “But a lot of parents are like, ‘Why aren’t you going to be a doctor? Why aren’t you going to be a lawyer? You should go into the medical field.’ My parents are very open to all kinds of options.”

A voice breaks over the intercom at Monta Vista High School, and try as he might, a certain senior-class member cannot escape it. It’s the daily bulletin, today offering sports results, test deadlines, and congratulations to June-Ho Kim for receiving an academic honor the previous weekend.

Talent From Abroad

“America,” the social critic Eric Hoffer once wrote, “needs new immigrants to love and cherish it.” But leaders in business and academe say the United States also needs them for another reason: They supply the country with critical science and engineering talent.

Facts about foreign-born brainpower:

• Roughly 51 percent of individuals with doctorates working in engineering fields in the United States were born in other countries.

• Of foreign-born professionals in science and engineering with Ph.D.s, the greatest proportion, 20 percent, are from China, followed by India, at 16 percent; the United Kingdom, 7 percent; and Taiwan, 6 percent.

• Three-quarters of graduate schools reported a decline in enrollment among international students in fall 2004; 40 percent of graduate engineering programs reported a decrease.

• Forty-seven percent of college officials surveyed last year said a decrease in the number of applications was the top factor in the declining enrollment of international graduate students; 29 percent cited visa delays or denials as the top factor.

• The number of science and engineering researchers in industrialized nations outside the United States, Japan, and Europe grew by 120 percent in the mid-1990s. Some see that growth as a sign that America is becoming less dominant as a destination for foreign-born scientists.

SOURCE: National Science Board and NAFSA: the Association of International Educators

“Is that the Intel?” his teacher asks. No, a different one, responds Kim, sitting upright, looking up and then down again. His classmates in U.S. government applaud good-naturedly before wading back into a review of legislative, executive, and judicial powers.

Though he has grown accustomed to accolades, Kim, dressed on this day in jeans and a dark sweater, would prefer to blend in, and a public school like this one makes it possible. By almost any measure, Monta Vista, located here in Cupertino, about an hour south of San Francisco, is an academic juggernaut. More than 95 percent of the seniors each year go to college. Scores on the SAT far exceed district and state averages. Student grades are so high, and competition for them so steep, that school officials in the 1990s did away with class rankings entirely. (A student with a 3.0 GPA would be in the bottom 40 percent of this year’s 535-student senior class.)

From 7:30 a.m. to 1 p.m. or so each school day, Kim, whose upright frame rises a few inches short of 6 feet and is topped by short, orderly dark hair, follows a typical Monta Vista senior schedule. He starts with physiology, then English, then government, Spanish, and physics, several of them honors- or AP-level. In some cases, though, his academic ambitions have required him to seek help outside high school: He’s taken cognitive neuroscience at nearby Stanford University, as well as psychology at a community college.

The day after the Synopsys awards show, he’s back in physics teacher Jim Birdsong’s class, reviewing the results of last week’s quiz on electrical potential. Kim received a 90, 10 points above the average. He missed the final

question, which asked students to figure the maximum speed of an object, gauging its force and other factors.

Some students attacked the problem mathematically, searching for formulas to help them find the answer, Birdsong explains later; others approached it more visually, the method chosen by Kim. From there, he broke the problem into component parts. The correct answer was: 3.21 m/s at x = 0.356 m. Kim appears to have had the right idea, but at one point he inserted an incorrect number into an equation, which threw off his total.

“A stupid mistake,” he concedes with a smile.

Kim may not be as strong in physics as he is in biology, Birdsong says, but as a student of science, he has gifts that cannot be taught. Occasionally, the teacher will turn on his home computer at night to find an e-mail from Kim, asking for an explanation of a phenomenon that puzzles him, often on subjects unrelated to physics. One recent nocturnal query had to do with images reflected in a mirror, and changes relative to the viewer’s position. Teacher and student sketched out an explanation in school the next day.

What separates Kim, as the teacher sees it, is his curiosity, infused with an ability to recall and make sense of information from several areas of science, quickly. “He’s trying to synthesize all the time,” says Birdsong, now in his 10th year at the school. Most students, by contrast, “live in the moment. That’s sort of a romantic way of saying they learn and forget. June-Ho thinks more about it, and he’s learned to ask more about it.”

June-Ho Kim with his family, from left, mother Jiyeon, father Youngbae, and sister June, at their home in Cupertino, Calif.

—Photo by Jon Manlove for Education Week

That inquisitiveness was evident from an early age. Youngbae Kim remembers that his son often brought home science lessons from school and asked, “Why are we doing this?” It was up to the father to find a real-world explanation.

The elder Kim, 46, recalls having that same hunger for knowledge, though his opportunities were much different. After receiving a master’s degree in electronics engineering from Seoul National University, Youngbae, accompanied by his wife, entered the United States on a student visa, then received an H-1B visa, given to highly skilled professionals. Eventually, he received a doctorate in computer science from the University of Tennessee, Knoxville, and secured permanent residency. Youngbae Kim later took a job in Colorado, where June-Ho was born, before the family settled in northern

California. He now works as an engineer at Synopsys (though he had no role in the April awards show), which has its headquarters in Mountain View, Calif.

It would have been an improbable career path only a generation earlier. Youngbae Kim's parents grew up under repressive Japanese colonial rule (many Koreans were forced to speak Japanese), and later, the upheaval of the Korean War. Educational options were limited.

Youngbae Kim today credits his wife, Jiyeon, a stay-at-home mother, with pursuing many of the academic and extracurricular outlets available to their children. When June-Ho considered taking an advanced math class at a local community college last month, it was his mother who helped him find the class on campus, and then picked him up in the family car afterward. The father encouraged him in other ways, occasionally taking him to science activities and classes arranged by his employers, where June-Ho could make various gadgets and ask questions. Later, Youngbae tried to help his son with homework, mostly in science and math subjects, and not as much in American history and English, where he admits he was not as confident.

"Some kids are given an opportunity, but they take it lightly," Youngbae Kim says. "June-Ho is trying to make the most of his opportunity, and do something more."

The Kims' journey is familiar to many families of today's top-performing math

the National Foundation for American Policy

the surrounding community of $1 million two-bedroom homes and office parks was dotted with apricot farms and granaries. As the high-tech Silicon Valley lured scores of scientists and engineers to the area, some of them foreign-born, the school's Asian population grew.

The assistant principal often talks with parents about setting realistic educational goals for their children—a mission that is complicated by cultural misunderstandings. Some Asian families, Keep says, do not initially grasp the full range of options offered by the U.S. university system because those choices do not exist in their home countries.

"It's not just Stanford, Berkeley, and Harvard," he says. "If you don't go to Berkeley, you go to Davis, or Irvine," Keep says, listing three campuses of the respected University of California system.

In the case of June-Ho Kim, Harvard University, which he will attend in the fall, was a perfectly feasible choice. His extracurricular record alone offers a strong sell: debate-team member, co-chair of the local Red Cross chapter, pianist for an ensemble that entertains senior citizens, student-newspaper writer. He also carved out time for independent-research projects on multiple sclerosis, his topic at both the Synopsys and Intel competitions.

While the written bios of some Intel finalists tell of perfect SAT scores and rankings as class valedictorian, Kim modestly declines to reveal those academic details. When it comes to academic prowess, he is familiar with the labels associated with science-and-math whizzes, and immigrant students in particular. Some people assume their science talent comes naturally, without having to work at it; others mistakenly think all their parents push them in those subjects. Not so, says Kim, who notes his parents are encouraging the interests of his sister, June, a Monta Vista freshman, in journalism.

June-Ho Kim, center, talks with other finalists Abhiram Bhashyam, left, and Michael Mi, at an international science competition staged by Intel in Phoenix this month.

—Photo by Tom Story for Education Week

Back inside Great America's auditorium, the fruits of June-Ho Kim's academic work are on full display. As the awards show begins, students are called to the stage to receive individual honors; Kim's name is called four times.

Football coaches have an expression to warn their players against launching into immodest celebrations after scoring touchdowns: "Act like you've been there before." Kim looks as if he's been here before. He shakes the hands of some presenters and nods politely to others across the stage, before returning to his seat each time with a medal, a ribbon, and a $50 check. Youngbae Kim holds up his camera and snaps pictures.

After a two-hour ceremony, it's time for the headliner event: the grand prizes. When the list of 13 winning students is read, out of about 300 entries, June-Ho Kim is one of them. It means an all-expenses-paid trip to the Intel International Science and Engineering Fair in Phoenix, held a few weeks later, where the potential awards include a $50,000 prize.

Kim is grateful for the recognition, and anxious about what lies ahead. A few months from now, he'll be at Harvard, majoring in biology and trying to decide which area of study most intrigues him. Right now, he's leaning toward neuroscience. When he talks about researching the brain, it seems to sum up what he enjoys about his studies today, long before he earns his first paycheck, publishes his first scholarly article, or examines his first patient.

"In a way, it's one of the most abstract parts of the human body," Kim says a few days after the awards show. "How does one organ function to keep all these complex things occurring, while also handling the metaphysical—dreams, thoughts, things like that? It seems like it's just a bunch of cells put together. Just to be able to explore that is very interesting."