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HOTHOUSE HIGH

Do US high schools dedicated to science generate future academics or burnt-out whiz kids? **Kendall Powell** catches up with some of the first pupils to graduate from 'nerd school'.

THSST TECHNIQUES STAFF

Sixteen years ago this month John Wilson, Heather Stevens and Rod Rippey graduated with the first class of Thomas Jefferson High School for Science and Technology in Alexandria, Virginia. On a recent Monday evening, in a tavern 15 minutes from their alma mater, they reminisced about their days at the science magnet school.

"I was a super-geek in eighth grade, programming in Basic and Logo on my Apple II Plus," remembers Wilson. "I told my parents, there's this high school where everyone is geeky like me." He pauses, then, "Hey, remember Karel the Robot?"

Stevens groans and explains that Karel was a pseudolanguage for teaching computer programming. "You know, it could only turn left, so to get it to turn right, you had to program in 'turn left, turn left, turn left' — that was when I decided I was not going into computer science," she says. Everyone chuckles — Stevens now works for a software-developing firm in Fairfax, Virginia.

Rippey comes back to the gathering's topic, "Jefferson was designed for me. I didn't fit in at my middle school." But although Wilson and Rippey jumped at the chance to attend high school with other self-confessed geeks, Stevens went grudgingly at her parents' request. "I had an aptitude in science, but I didn't necessarily like it," she recalls.

It *is* rocket science

Two decades ago, some of the first science, maths and technology magnet high schools opened in the United States. The Illinois Mathematics and Science Academy (IMSA) in Aurora, outside Chicago, was established the same year as Jefferson in 1985. The magnet concept caught on quickly as a way to challenge the best young minds, and as a possible answer to the decline in US-produced scientists and engineers. There are now 86 science magnet schools nationwide, which select gifted children with an aptitude for science. Australia, Jordan, Israel, Korea, Thailand, Japan and the United Kingdom have set up similar science-focused schools.

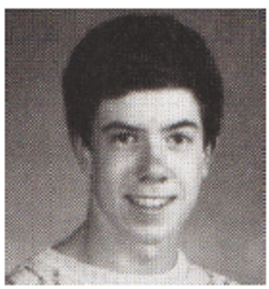
But is it a mistake to immerse students in the sciences at the age of 14 or 15? By the time they reach graduate school, such students have already spent eight years in focused study. Is 'nerd' school a place where overachievers bloom while others wilt under the pressure? Or would their talents be undernourished at a 'normal' high school? Graduates of the high-tech highs give a range of answers.

"It was highly competitive and many thrived on it," says Wilson. "I've never been among so many ridiculous brainiacs since." He, Rippey and Stevens left Jefferson with widely different impressions and goals, but they all ended up in technical careers.

At Jefferson, Wilson soon realized his computer talents paled in comparison with those of others. He shifted to biology and eventually became a psychiatrist working for Fairfax county's mental health department. Rippey's interest in electronics carried him through Jefferson and a college degree in electrical engineering. He has since worked for government military contractors, and at one point was literally a rocket scientist.

"I've always been surrounded by really smart people," he says, high school being just the beginning. But Stevens did not thrive on the competition. Instead, she says, she felt like the dumbest kid in school and describes it as the worst four years of her life.

"School killed my interest in science. I was



Peter Hesse

Matthew Appler

Then and now: Peter Hesse and Matthew Appler flourished at Jefferson High and later founded their own computer-security firms. Today, Jefferson students work together to solve problems in 'circular' discussion groups (right).

Research is a major part of the final year at Jefferson High.

already burnt-out when I got to college," she recalls. After college, she rebelled by taking a job at a customs brokerage firm. "I was the smartest person in the company and moved up fast — it was definitely not rocket science," she says with a nod to Rippey. "I needed that time to feel smart," she adds. Eventually, her technical abilities led to a career in software.

Go team

The friendship between Jefferson graduates Matt Appler and Peter Hesse is underscored by healthy competition. They took a physics class together in college that turned into a two-man challenge. "And I won," Appler gloated over burgers recently. "Yeah, but you're two years older than me," rebuts Hesse. Each now runs a computer-security company.

Competition inevitably arises when over-achieving students are placed under one roof. "These students are driven from within," says IMSA principal Eric McLaren. "We knew that we had to foster collaboration and downplay competition." As such, both Jefferson and the IMSA do not calculate class ranks and have no valedictorian. McLaren says his teachers promote group, rather than individual, efforts.

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Team projects and student-led learning methods dominate at magnet schools, where pupils operate far above textbook level. Schooldays tend to be longer and frequently stretch to 12 hours with extracurricular activities and research projects. Schedules run in modules to accommodate in-depth labs and classes lasting up to two hours.

Bright young things

Ande Croll, an IMSA graduate, recalls an interactive physics lesson. Her instructor took the class outside and had them practise throwing spiral passes with an American football. The mechanics lesson on why the spiral improves the pass "sticks with you", says Croll, a mechanical engineer who now designs electronics for fighter jets in Rockford, Illinois.

This discovery-based learning is everywhere in Jefferson today. In Paul Cammer's biology class, students form a discussion circle. Cammer has posted an observation about ladybird beetles for the students to explain. He sits at the centre of their circle, nudging plausible ideas forward but rarely intervening. The students lead the debate, and seem unafraid of suggesting crazy ideas or looking stupid.

Cammer keeps them working within reasonable constraints of modern-day research, too. "Remember, you don't have $3 billion from the National Science Foundation. You are a high-school student working with beetles in your attic." The students arrive at a reasonable and testable hypothesis 45 minutes later — in some ways, functioning like they are halfway through graduate school.

"The classes at the IMSA taught you how to think," says Scott Gaudi, an astronomy post-doctoral fellow at the Harvard–Smithsonian Center for Astrophysics in Cambridge, Massachusetts. "Our classes were: 'Here's a problem or something that happened in history, now try to find out why it happened that way,'" he says. "This is the way we do research."

Gaudi, who searches for planets beyond our Solar System, was named one of the top-20 scientists to watch in the next 20 years by *Discover* magazine. "I would have probably been in astronomy without the IMSA, but I would be nowhere near as successful," he says. The IMSA and Jefferson both require students to do research projects during their senior year, either in the school labs or with local universities or businesses.

Only a handful of alumni have become academics, albeit in greater numbers than your average school. But most of them do work in science- or technology-based jobs. In general terms, magnet schools go a long way towards increasing the country's technical workforce.

"At a time when the United States is producing fewer and fewer scientists, engineers and mathematicians, the IMSA's doing it. It seems like the school sends more students out every year to do jobs that are technology-based," says Michael Brody, an IMSA graduate and now a Homeland Security policy adviser for the state of Illinois. The numbers support his claim.

Two-thirds of IMSA graduates earn a degree in science, maths or technology. For females, that is four times the national average. About 40% of alumni earn a graduate degree, with healthcare and computer professions as the top career fields.

Repelled by magnets

But science magnet schools are not for everyone. Chris Colin, a writer and Jefferson graduate, tracked down half the class of 1993 for a book about his classmates. Many of his peers had, like himself, struggled to find careers outside science. "At 14, I didn't know what the hell I was doing," he says. Colin says the tunnel vision at Jefferson hindered thinking about other interests and career choices.

Bettie Stegall, a veteran English teacher, uses her creative writing class to push her students to stretch the other side of their brains. The day I visit, her announcement about a poetry assignment receives collective groans.

But some of her students say they wish they had more opportunities to take music, business and other non-science courses. One laments that she had to take summer school twice to fit music into her schedule of required science classes. She plans to major in music at the University of California, Berkeley, in the autumn. "But at another school I probably would have fallen in with the wrong crowd," she admits. Two-thirds of the seniors say they would not have chosen Jefferson again, but it's likely that some will change their minds once school is behind them.

Many of the alumni blossomed at Jefferson. Hesse and Appler continue to challenge each other as their firms expand and their toddlers play together. "I would absolutely encourage my kids to go there," says Appler. "Jefferson brought you out thinking you could do anything."

Did these alumni also have 'normal' high-school experiences? Sure: Brody was elected to the Prom Court, Rippey and Wilson were both on the running team and a senior-year prank involved assembling a Volkswagen Beetle inside the school lounge.

It didn't hurt to have nerdy football cheers to confuse opponents, either. Stevens chants the final bit over dinner: "Secant-Tangent-Sine-Cosine. Three-point-one-four-one-five-nine!" (That's pi for the rest of us). ■

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