

JOURNEY TO WORK

EUROPEAN MODEL COMBINES EDUCATION WITH VOCATION

BY BETTY JOYCE NASH

Cameron Friday has always been a hands-on learner. He liked math better than English, studied auto mechanics and drafting in high school, and figured he would study engineering in college. But as a high school senior, he discovered another choice: Apprenticeship 2000, run by eight manufacturing firms in the Charlotte, N.C., area. It's based on a European training model that combines full-time work with school.

He reconsidered his options. "The thing about engineers is they sit at a desk all day, but I like building things and watching them come together," he says. He decided to try for the machinist apprenticeship. It wasn't easy: Besides good grades, references, and a high score on a mechanical aptitude test, he needed to perform well in an exercise that required him to assemble an object from a box of parts, hand-filing them to highly exact measurements. From the original 100 students who expressed interest, only 20, including Friday, made Apprenticeship 2000's final cut.

For half a century, education policy in the United States has emphasized college in the belief that general education best prepares workers for stable, well-paying jobs over a lifetime. In Europe, many students instead go into a highly developed and systematized form of vocational education, which aligns learning with business and industry, and smoothes young peoples' entry to the workplace.

Since the 2007-2009 recession, vocational education has gotten more attention, especially as college costs rise, student loans mount, graduation rates stagnate, and the labor market disappoints. Might viable post-high school career paths now start in the stigmatized classrooms of what is called "career and technical education?"

Europe's Dual System

Germany and Switzerland educate roughly 53 percent and 66 percent of students, respectively, in a system that combines apprenticeships with classroom education — the dual system. This approach brings young people into the labor force more quickly and easily. Unemployment for those in Switzerland between the ages of 15 and 24 in 2011 was 7.7 percent; in Germany, 8.5 percent. In the United States that year, the rate was 17.3 percent, down from 18.4 percent the previous year. (A 10 percent higher rate of participation in vocational education in selected Organization for Economic Cooperation and Development countries led to a 2 percent lower youth unemployment rate in 2011, according to economist Eric Hanushek of Stanford University.)

The dual system produces other economic benefits, according to Stefan C. Wolter of the University of Bern and Paul Ryan of Cambridge University in an article in the *Handbook of the Economics of Education*. These pluses include the cognitive and motivational effects of combining book learning with work, a closer match between the requirements of the job and lesson content, better school-to-work transitions, and an opportunity for employers to assess potential future employees.

The Swiss and German systems are widely cited as successful bridges to several hundred occupations. At ages 15 to 16, in Switzerland, about two-thirds of every cohort enter apprenticeships, Wolter notes. Apprentices in fields from health care to hairdressing to engineering attend vocational school at least one day a week for general education and theoretical grounding for roughly three years. On other days, they apprentice under the supervision of a seasoned employee.

What makes the system work so well is firm participation, which is relatively strong. "If you exclude the one-person companies and the businesses that cannot train, about 40 percent of companies that could train do train," Wolter says.

Apprentice spots are competitive. "We look specifically for young people with a high degree of motivation to learn, commitment, respect, and flexibility — in mental and geographical terms — and openness," says Natalie Hamela, a spokeswoman for the apprentice program at Swisscom, a telecommunications firm.

Swisscom offers roughly 250 apprentice slots annually and chooses from an applicant pool of about 8,000. The firm hires about half of its graduating apprentices, but those in the other half, Hamela says, "are surely employable. We train our apprentices for the employment market, not just for Swisscom."

Student-apprentices create applications for smartphones, organize events, write articles or produce films for company media, or consult with customers.

Another option for students, if they can't get an apprenticeship, is full-time vocational school. Either way, there's a path for those who don't make it — or don't want to make it — into a university for a general education.

In Germany, about 25 percent of students go to university, and apprenticeships employ another 53 percent. At 16, they sign on for a three-year stint in one of 350 occupations. Another 15 percent may attend vocational schools. Those

who are less qualified take a full-time vocational course or temporary job until they land an apprenticeship. About one-quarter of German employers participate.

The apprentice system is enabled in part by cooperation between employers and unions and by strong secondary education systems. Students in Switzerland and Germany outscore world averages on the Program for International Student Assessment, or PISA, which assesses 15-year-olds across countries in math, science, and literacy.

Participating students also don't have to worry about losing any status. In Switzerland and Germany, parallel training in school and on the job is considered nearly as prestigious as a university track, according to Nancy Hoffman, author of *Schooling in the Workplace* and vice president of the Boston-based nonprofit Jobs for the Future. Apprenticeship seekers there include many who, in the United States, might attend a university.

Other western European countries use variations of the Swiss and German model. Belgium, Finland, Sweden, and the Netherlands train most vocational students in school programs, while Germany, Switzerland, Austria, and Denmark have large school-and-work programs.

The United States is an outlier: By international standards and official definitions, it has virtually no vocational education and training program. But the learning-by-doing mentality may be spreading in the United States, especially in advanced manufacturing, where firms need highly skilled workers. European subsidiaries such as Daimler, Volkswagen, Stihl, Siemens, Blum, and others struggle to find them. Apprenticeship coordinator Thomas Kuehne, of Virginia Beach, Va.-based Stihl Inc., says, "We took the dual system and shaped it to fit our own needs."

Apprenticeship American Style

In the United States, vocational education has been disparaged by some as a place for students perceived as unwilling or unable. The United States still largely champions college as the route to higher lifetime wages and the flexibility to retool skills in times of economic change. Yet just 58 percent of the 53 percent of college-goers in 2004 who started at four-year institutions finished within six years. Moreover, 25 percent of those who enter two-year community colleges don't finish. Only about 28 percent of U.S. adults over age 25 actually have a bachelor's. What about the rest? What's their path to the workplace? It may be unrealistic to expect everyone to finish college, but most students will need more than a high school education as jobs become more complex.

For the future workplace, students need skills that can't



John Stutt, 19, files a spare part for a computer controlled milling machine at Blum Inc. He is in his third apprenticeship year.

be easily automated and outsourced: technical know-how, interpersonal skills, and adaptability, according to David Autor of the Massachusetts Institute of Technology.

"Many traditional jobs that employed high-school and some-college workers are in decline," he says. In 1973, 72 percent of jobs required only a high school diploma or even less education, compared to about 40 percent of jobs today. Those jobs will keep shrinking in number.

The factory jobs of today, for example, require multi-discipline engineering skills — software, mechanical, electronic, systems. One company that finds itself challenged to find people with those skills is Siemens Energy, a U.S. subsidiary of the German conglomerate Siemens. The company needs these "mechatronics" technicians for its production of gas and steam turbines and generators.

"We have predicted a skills gap for the last five years and we're seeing it," says Pamela Howze, training and development manager at the company in Charlotte. "High school is all college-focused. It is to our detriment. We are a state-of-the-art and advanced manufacturer; everything is computer-run, with robots and lasers."

The Apprenticeship 2000 student-workers, like Friday, attend the Central Piedmont Community College and work at one of the program's partner companies. Among those companies is Blum Inc., an Austrian manufacturer of high-end cabinetry hardware. Blum co-founded the apprenticeship program in 1995 to find and train its own technicians. The company has graduated between three and six apprentices annually since 1995, a total of 49. "It changed everything for us," says technical training manager Andreas Thurner, who entered his own apprenticeship in Austria at age 15. "Most of our workforce comes out of this program now."

Students today can't get the kind of advanced manufacturing training in college they can on the job, Thurner says. "The companies are the ones who have the technical knowledge and the equipment."

Vocational education in the United States has struggled, in part, because of the notion that early "tracking" into a trade might derail students from the college track. But what happens to the non-college-bound student?

David LaRose, a graduate of the Chesterfield Technical Center in Chesterfield County, Va., says the stigma of career and technical educations persists. He even had trouble convincing his parents to allow him to attend.

Parents' Day at the center changed their minds. "We were all impressed by the amount of college credits that I would get, 19, the chance to earn industry high-level certi-

fications, and the chance to learn from industry professionals,” he remembers. He studied computer systems at the center’s Cisco Networking Academy.

Today, students at tech centers nationwide can choose from among 16 career “clusters” that include finance, transportation, human services, and lots of science, especially in health careers. For the 2012-2013 school year, the center in Chesterfield had 1,640 applications, up 4 percent from the previous year, says Michael Gill, executive principal of Career and Technical Education in Chesterfield County. The center offers about 1,000 spaces; more will become available when the county opens another center in 2014.

Students can get hands-on experience inside and outside the classroom. Automobile dealers, like manufacturing firms, want to “grow their own technicians,” says Matthew Brown, the automotive technology teacher at the Chesterfield Technical Center. Apprentices during senior year attend class once a week and work the other four; they earn \$8 an hour.

Mike Garcia apprenticed as an automotive technician at the Lexus of Richmond dealership in 2004. Garcia graduated from high school with a 3.3 grade point average and opted for work over studies in architectural engineering at Virginia Polytechnic Institute and State University. “It was going to cost me, what, \$20,000 a year? When I was presented with the apprenticeship program, they offered free tools, the chance to start working right away, and at the time it seemed like the easier thing to do,” he says. “You can sit in a classroom and be told all these things, but you really learn when you work hands-on.”

But training tailored to specific industries may be worth very little during a dramatic industry restructuring unless a worker has a knowledge base that lays the foundation for lifelong learning. A labor force that assimilates change improves economic growth prospects.

Trades and Trade-offs

For many youth, vocational education offers better employment prospects than general education, at least in the short term. Yet a dynamic, growing economy requires workers who can innovate, adapt, and spread that innovation, all of which is associated with general education. Evidence suggests that academic skills — math, reading, and scientific understanding — affect economic growth in this way by setting the stage for more learning, according to Hanushek.

In the labor market, the specific training that smoothed the transition to work in youth may prove to be a liability, not only for individual workers but ultimately for economic growth if they can’t adapt to technological change as they age. Economists Hanushek of Stanford, Ludger Woessmann of the University of Munich, and Lei Zhang of Tsinghua



A machinist mentor instructs apprentices about the key features of a generator at Siemens Energy’s generator factory in Charlotte, N.C. Producing the generators requires weeks of precise machining to tight tolerances.

University investigated early advantages of vocational relative to general education over the life cycle in a 2011 National Bureau of Economic Research working paper.

The authors studied the difference in employment, wages, and career-related training between those who receive a general education or a vocational education. They used data from the International Adult Literacy Survey, which details the education and skills of workers in 18 countries with varying vocational education and training regimes. The survey included information not only about schooling type and length but also age, gender, employment status, earnings, adult training, parents’ educational attainment, and, significantly, cognitive test results.

Their findings suggest that those with general education fare worse in the job market — at first. As they age, however, their prospects improve in relation to those of vocational education students, even in countries with strong apprentice systems. Adult training, in particular, affects that pattern: Those with a general education had taken more career-related training relative to those with vocational education, “giving them the opportunity to continue updating their skills to be employed in a changing economy,” the authors write.

But who comes out ahead? It depends where you look, and what you’re looking for. In Switzerland, the authors find a positive lifetime earnings return for apprenticeship workers. “Early earnings gains more than make up for the gains in later earnings that accrue to workers with general training, and vocational workers have 8 percent higher lifetime earnings,” according to the authors. The figure excludes costs, public and private, of education and training. In contrast, in Germany and Denmark, workers with general, rather than vocational, educations had 24 percent and 6 percent higher returns, respectively, on lifetime earnings.

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ticated and complex, there has been greater specialization and dispersion of tasks in the entertainment software industry. According to Solomon, large game development teams may require programmers that aren't involved in the design. For example, someone may be needed just to develop and run the database that stores the inventory of items that players have accumulated in an online role-playing game.

The sharing of specialized inputs is the third type of localization economy. That may be less important in the game industry, however, than in some other industries, according to Strange. "It's not obvious to me what inputs would be shared." He suspects they may use the same lawyers or accountants, but neither is particularly geared toward the entertainment software industry.

Game developers occasionally fill holes on their development teams by hiring specialists in areas like sound production or graphics rendering. But such outsourcing doesn't happen often. At both BreakAway and Firaxis, the back-and-forth of the creative process works better when everyone working on a project is in the same office.

The Future

The entertainment software industry appears to have come full circle. Now that individual game developers can submit

their work for posting on Apple's App Store or Google Play, they can attract a following like Doug Whatley did when he posted games on CompuServe decades ago.

As a result, a number of smaller, independent companies have popped up, says Solomon. "It's like a new renaissance of the small indie game companies, kind of like it was the 1970s and '80s."

Game developers have come full circle in another way, according to Whatley. Developers that used to test their products on multiple configurations of IBM's PC are now doing the same thing for smartphones and tablets that run on multiple operating systems. "It's all played out before," he adds.

These changes will keep central Maryland's game developers and publishers on their toes. Some firms may contract while others may expand. So far, the region's cluster has held up. Big Huge Games shut down last May and could have left about 100 people out of work. Instead, many of them have been employed by Impossible Studios, a new outfit opened in Hunt Valley by Cary, N.C.-based Epic Games in August 2012.

"It is one of the most exciting and also one of the most frustrating things about game development — it's never the same," says Solomon. **RF**

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Though questions remain about whether vocational or general education yields more benefits to the individual and the economy, it's not an either-or, but a dual system. As Gill of the Chesterfield Technical Center notes, "If a student wants to go to work, we help them, but we want them to go on and get as much education as possible." That higher education includes not only four-year colleges but also trade, technical, and community colleges. "We want students to

broaden their skill set and certifications."

Garcia, the automotive technician, is 26 now. The apprenticeship got him started, and now he's back in school while still working, earning his associate's degree in mechanical engineering because he'd like to work at the corporate level at Toyota or Lexus.

He's adding to his skill portfolio. Probably not for the last time. **RF**

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