



NEW IDEAS ABOUT NONTRADITIONAL

We have been visiting schools and looking for fresh ideas about attracting and retaining nontraditional students. We would love to continue this work, visit more schools, and talk to more teachers. If you are interested in sharing what you have done, please let us know.

GET HELP FINDING DATA

Now is the time to begin planning new programs. The first step in this process is checking out employer demand. Trailblazers can help you find the official data that you need to submit with your program application.

Virginia CTE professionals can contact Trailblazers any time for help with data needs. Don't waste time looking for information that we can help you find in five minutes. Just call, 434-982-5582.

COMPLETER FOLLOW-UP

The results of the Virginia 2011 Follow-up of 2010 CTE completers are now available online at <https://completers.coopercenter.org/>. Administrators can log on and see their divisional results with the same passwords used for conducting the survey in the spring. If you no longer have your password, please call and we will upload it for you via the SSWS drop box.

TRAILBLAZERS BLOG

There is more to say about *Trailblazers'* topics than will fit in our newsletter, so we're writing a blog now. Take a look: <http://ctetrailblazers.blogspot.com/>



Learning that works
for Virginia

Why Invest in CTE and STEM in High School?

Workers at all levels of education are needed to fill the gaps in the demand for STEM competencies. What's missing in our drive to raise STEM competencies, according to a new report "*STEM*" from the [Center on Education and Workforce](#) (CEW) at Georgetown University, is a clear pathway between high school STEM courses and careers and higher education in STEM fields. This is true for all students, but **particularly** for those students who are heading to community colleges or right to work after high school. The report argues that expanding and improving career and technical education STEM programs in high school is essential in order to deal with what the authors predict is an "impending shortage of STEM competencies."

STEM has been the focus of much attention in our schools recently, but most of the effort in this arena has been devoted to preparing elite students for baccalaureate and post-graduate programs. While college-educated STEM workers with bachelor's degrees or higher make up the largest proportion of STEM workers, there are also many opportunities in STEM for students with associate's degrees, certificates, and even some for students straight out of high school. Consequently, we should be teaching STEM skills to students at all levels, educating them about opportunities in STEM careers, and providing them with clear pathways to higher education.

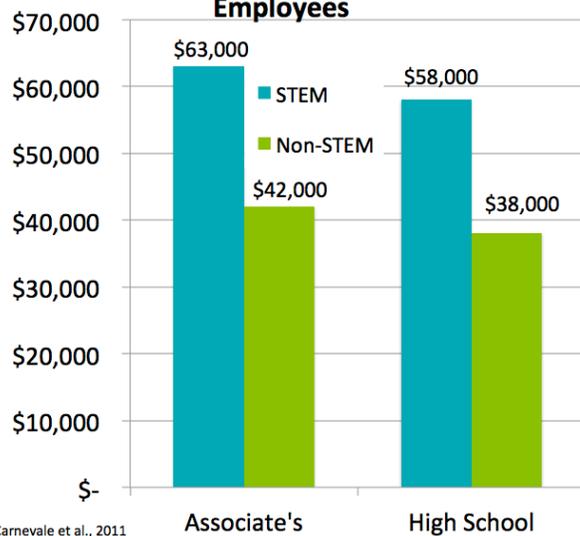
The CEW report predicts that nationwide, about 35% of STEM job openings through 2018 will require a high school education, some college, or an associate's degree. That means 840,000 of the 2.4 million predicted jobs in STEM will go to employees who have *less than* a bachelor's degree. Yet general education curricula tend to discourage average students from continuing into STEM fields:

Different Meanings of STEM

There is no standard definition of STEM and different reports use different definitions. For this "*STEM*" report, CEW included the following occupation groups: Computer occupations; engineering and engineering technicians, life and physical science occupations; architects, surveyors, and technicians, and mathematical occupations. The Department of Commerce reports discussed in previous posts exclude architects from their definition of STEM, but include STEM managers.

"One of the most difficult challenges in the American education system will be improving the middle of the test score distribution. The demand for high-level skills, including STEM skills, has grown well beyond the elite careers that require a Bachelor's or graduate degree...Strengthening the relationship between education and STEM competencies begins with a stronger focus on the **middle** in education policy." (page 76)

Comparative Wages for STEM vs Non-STEM Employees



Carnevale et al., 2011

Not only does our economy need high school and community college graduates to fill nearly 1 million STEM jobs in the next decade, but those students will reap enormous benefits from an education that prepares them for these jobs. The "STEM" report

finds that people with a high school diploma or less have higher lifetime earnings working in STEM jobs than in any other field. STEM jobs also pay more than all other fields for people with an associate's degree, some college, or a postsecondary certificate. The graph to the right shows how employees with less than a college education can earn more working in a STEM job than in other fields.

In Virginia, the majority of projected STEM employment still requires a 4-year degree or higher, but more than 30% of Virginia STEM jobs will be at the associate's degree level or lower. According to CEW projections, in 2018 there will be about 25,000 jobs in STEM fields in Virginia that require a high school diploma, 31,000 that required some college, and 56,000 that require an associate's degree. In total, their report predicts 113,000 jobs that require less than a bachelor's degree in STEM fields. [See CEW's 2010 report, [Help Wanted](#)]

In order to qualify for these STEM careers, however, students need to have a clear pathway laid out for them in high school and to be provided with a clear and effective transition to a two-year college. However, unless students are part of the minority who take a CTE program focused on STEM, they are rarely shown how to connect STEM courses to STEM careers. According to the report, nationwide:

"American high schools offer very little career and technical education or any substantial on-ramps to

Predicted Jobs in Virginia by 2018, by Occupation and Education Level

| STEM Occupations | High School Drop Outs | High School Graduates | Some College | Associate's Degree | Bachelor's Degree | Graduate Degree | Total |
|------------------------------------|-----------------------|-----------------------|--------------|--------------------|-------------------|-----------------|---------|
| Computer & mathematical scientists | 1,000 | 15,000 | 20,000 | 40,000 | 109,000 | 67,000 | 253,000 |
| Architects & technicians | 0 | 2,000 | 3,000 | 4,000 | 7,000 | 4,000 | 20,000 |
| Engineers & technicians | 0 | 6,000 | 7,000 | 10,000 | 33,000 | 20,000 | 76,000 |
| Life & physical scientists | 0 | 2,000 | 1,000 | 2,000 | 8,000 | 12,000 | 26,000 |
| | 1,000 | 25,000 | 31,000 | 56,000 | 157,000 | 103,000 | 375,000 |
| Source: Carnevale et. al, 2010 | | | | | | | |

postsecondary career and technical education. As a result, students who don't get career and technical preparation in high school and don't succeed in the transition to postsecondary programs are left behind." (page 76)

In our current general education system, courses are organized into hierarchies — a student moves from algebra I to algebra II, or from biology to chemistry to physics — and teachers focus primarily on moving students from one academic level to the next. The report argues that to better prepare students for STEM "we should focus on developing curricula that put academic competencies into applied career and technical pedagogies and link them to postsecondary programs in the same career clusters" (page 76). This is the strategy that is now being applied in the majority of Virginia's CTE programs, with our firm emphasis on career education and counseling, dual enrollment, and industry certification. Furthermore, Virginia's CTE programs do reach a large percentage of secondary students. But there is more work to do to reach all of the students who need to build these skills.

The "*STEM*" report concludes that to improve the STEM workforce and the American economy as a whole, we need to begin by expanding and broadening access to STEM-based career and technical education programs. The report recommends four steps:

1. High school and postsecondary career and technical programs should focus on broadly conceived career clusters that maximize further educational choices as well as employability, as many students will need jobs if they are to pay for college and related expenses.
2. To the extent possible, "learn and earn" programs in STEM should allow students to work and study in the same field beginning in high school.
3. Programs of study that align high school and postsecondary STEM curricula should be strengthened.
4. Hybrid programs that mix solid technical knowledge with the development of more general skills and abilities should be encouraged in a broader range of schools.

Virginia's [Governor's STEM Academies](#), which combine work-based learning with academic and CTE STEM courses articulated to postsecondary programs, are exactly the kind of programs that the "*STEM*" report recommends. But they are not the only programs working toward this goal. The majority of our CTE programs include science, technology, and mathematics instruction coordinated with academic instruction; clearly articulated pathways to careers and postsecondary education; and some opportunities for work-based learning. However programs of this sort are complex, expensive to teach, and expensive to administer. Without substantial support from school divisions and the state, it will be impossible to expand and broaden access to these programs in the way that "*STEM*" recommends.

Planning a New CTE Program? Here's how to find employment data for your application

CTE is an employment driven program. Ideally, students' academic studies and CTE courses work hand in hand to prepare them for adult life: academic courses provide a broad educational background and CTE courses prepare students with targeted career and workplace readiness skills. To remain employment-driven, it's important to keep in close contact with local employers and to mine their knowledge of the skills that students need and the jobs that will be available.

Keeping in touch with employment trends is particularly important when planning new programs. CTE aims to provide students with course options that will open job opportunities, not just courses that will attract their interest. Gauging stu-

dent interest is important, of course, and a required step in the planning process, but most students know very little about labor market trends. They often underestimate the value of STEM skills, for example, and overestimate the potential for a career in the arts.

Keeping in touch with local employers is one of the best ways to gauge which programs are likely to offer employment opportunities. Last month's post about the steps that Hanover Center for Trades and Technology took to develop a new HVAC program shows how valuable close employer contacts can be. By targeting a program with high employer interest, Hanover was able to find significant funding for their new program as well as great job prospects for their students.

State and national data sources can also give you quantitative information about labor market trends. This is easy to include in your program application and is an important element of any grant application for program support. Unfortunately however, these data can't answer all of the questions that we want answered. Comprehensive statistics are collected on many large, well-established occupations, such as nursing, teaching and welding. Data on other occupations is not so good. And sometimes it is virtually non-existent. We have had several requests lately for information on modeling and simulation occupations from people who are thinking about introducing the new CTE www.ctetrailblazers.org/course on that career. Unfortunately this is a new occupation, and the closest occupation title that we can find for these jobs in conventional data sources is " Engineering Technicians, Except Drafters, All Other." This is hardly useful.

Even in these difficult cases, however, there is usually some information that, along with the input that you get from employers, will help you make program planning decisions. Please feel free to get in touch and we will help you find whatever data are available.

For help call us at 434-982-5582 or email us at trailblazers@virginia.edu.

If you would like to set out data-gathering on your own, here are some data sources to use:

- [Virginia Workforce Connection](#) — VWC, powered by the Virginia Employment Commission, has a lot of great data on employment and employment trends. The site is somewhat clunky, but if you start from the main page and go to Labor Market Information>Area, Industry, and Occupational Profiles, you can find occupational projections for Virginia and for Workforce Investment Areas. The current projections series starts with 2008 and goes through 2018. Unfortunately, this set of projections was made before the current recession really took hold, and I think they are overly optimistic for most occupations. A new series of projections should be coming out about a year from now.
- [U.S. Bureau of Labor Statistics Employment Projections Program](#) — The Bureau of Labor Statistics produces detailed national employment projections for hundreds of occupations. New projections for 2010-2020 will be coming out in February, and we will be writing about them in this blog. The BLS is the most important source of statistical information about occupations and employment in America. Their website has a wealth of detailed information, but by and large the site is set up for researchers and is not simple to navigate. However, lots of resources are available to give you the high quality BLS information in an easily accessible form.
- [Occupational Outlook Handbook](#). For hundreds of different types of jobs—such as teacher, lawyer, and nurse—the Occupational Outlook Handbook includes the training and education needed, earnings, expected job prospects, what workers do on the job, working conditions, as well as projected job openings. Keep in mind that most of what you find on the BLS site is national-level data, not Virginia specific data. The site will link you back to the Virginia Employment Commis-

sion when you go looking for Virginia-specific occupational data.

- [Occupational Outlook Quarterly](#) — This magazine has interesting career articles, many of them suitable for students. [The 2008-18 Job Outlook in Brief](#) gives you quick evaluations of future job prospects for hundreds of occupations.
- [BLS Career Guide to Industries](#). The CGI gives information about trends in various industries, instead of trends in specific occupations.
- [Career One Stop](#) — This site provides profiles for hundreds of occupations. It includes wages, employment trends, knowledge/skills/tasks/ activities, tools/technology, education/training requirements, related occupations, and web resources for the occupation you select in your state. It also includes the state-level information for Virginia using the same data that you find on Virginia Workforce Connection. National data comes from the Bureau of Labor Statistics and O*Net.
- [My Next Move](#) — This is the site for quick access to basic stats about careers. If you just need to know a few facts, this is the simplest way to go. The data included here are the same that you find on Career One Stop, but My Next Move only includes the highlights, and the interface is much easier. For more on this site, check our post [Looking for a Few Quick Career Facts?](#)

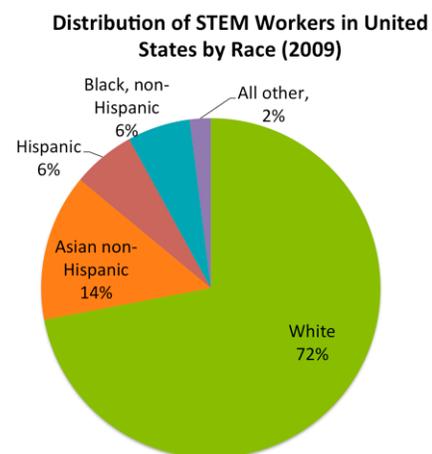
Hispanics and African Americans Underrepresented in STEM Jobs

We already know that STEM jobs are important for U.S. workforce competitiveness and that more STEM workers are needed to fill market demands for STEM jobs. A particular concern in the movement to increase interest in STEM, however, is to increase the racial and ethnic diversity of those working in STEM jobs.

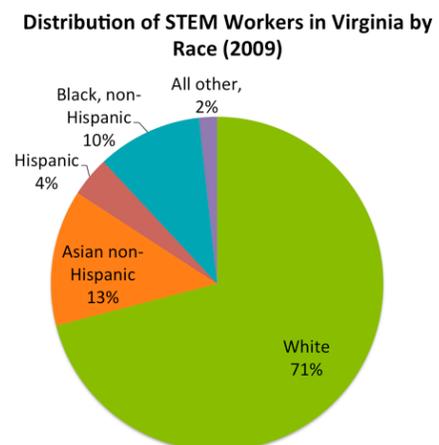
In order to increase STEM diversity, we need to improve minority college graduation rates. According to

a new [U.S. Department of Commerce report](#), low graduation rates for African Americans and Hispanics play the largest role in limiting their employment opportunities in STEM fields. Currently only 14% of Hispanics and 22% of African Americans have a bachelor's or higher degree, compared to 35% of whites and 54% of Asians.

As pictured in the chart below, about 75% of all STEM employees are white. Even though blacks make up about 11% of the *total* U.S. workforce, they are noticeably underrepresented in STEM jobs, and account for only about 6% of the total STEM workforce. Asians, by contrast, are overrepresented in STEM fields; about 14% of STEM workers are Asian, even though Asians make up only about 5% of the total U.S. workforce.



Source: US Department of Commerce

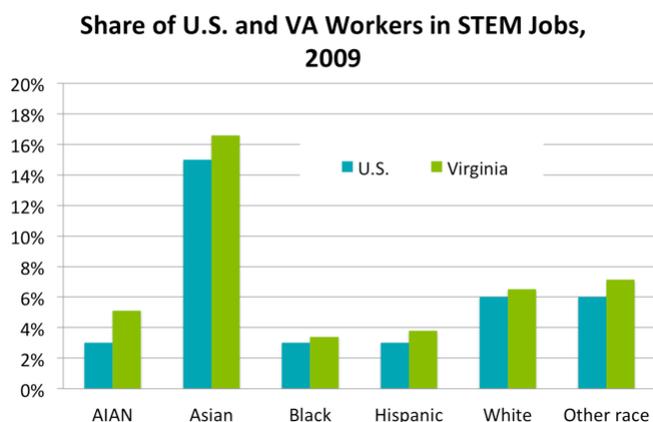


Source: American Community Survey, 2009

Virginia's STEM workforce is similar to the national STEM workforce. However, we have somewhat more African Americans and fewer Hispanics in our STEM workforce, just as we have somewhat more African Americans and fewer Hispanics in our population. Overall, in our STEM workforce:

- Whites have the highest proportion of STEM jobs.
- Blacks and Hispanics together make up about the same proportion of STEM employees as do Asians.

The chart below looks at the STEM workforce in a slightly different way. It shows the percentage of workers in each race and ethnic group who are employed in STEM jobs. It compares data from the U.S. Department of Commerce report on U.S. employment with data on Virginia employment from the American Community Survey.



Source: US Department of Commerce and 2009 American Community Survey

Here are some things the graph can tell us about Virginia:

- A larger percentage of each racial group is employed in a STEM job in Virginia than is true for the nation.
- In comparison to the nation as a whole, Virginia has a larger proportion of STEM jobs.
- About 17% of Virginia's Asian workers are employed in STEM jobs, the highest proportion of

any group in Virginia. Less than 6% of white Virginians work in STEM jobs.

- As in the nation, a smaller percentage of Hispanic and black Virginians work in STEM jobs than white Virginians.
- American Indian and Alaskan Natives are somewhat more likely to have STEM jobs in Virginia compared to national levels.

How do we encourage racial equality in STEM?

[The new report by the Department of Commerce](#) finds that increasing education leads to more racial equality in STEM jobs. Regardless of race, the DoC found that having a college degree increased the likelihood that an individual would have a job in a STEM field:

"A common thread throughout this report and also touched upon in our earlier reports, is the importance of education as a gateway to high-quality STEM jobs. Enabling and encouraging equitable access to premium education is critical to ensuring that America maintains a wide and diverse source of STEM professionals that help to advance U.S. innovation and global competitiveness."

What the Department of Commerce report is saying is not something that is necessarily new to us, but is nevertheless still an important message: encourage Hispanic and African American students to earn at least a bachelor's degree, significantly increases their chances of securing STEM jobs, and the higher incomes and opportunities that come with them.

So, what can we do in Virginia?

Despite the fact that Hispanics and African Americans have a higher relative wage premium for STEM jobs, we have seen little growth in the percent of Hispanic or black workers in STEM jobs since 2000. Furthermore, the Department of Commerce report found that non-Hispanic black students were less likely than whites or Hispanics and significantly less likely than Asians to choose a STEM degree. *CTE can*

be a solution. By encouraging and exciting minority students' interest in math and science, CTE can also be a means to increase the number of minority students in Virginia who go on to pursue higher degrees in STEM fields.

How to Locate Employers in Your Community

How do you get started building partnerships with local employers? Reaching out to employers is next to impossible if you don't know where to find them, but you can get help from two valuable websites that show:

- the 50 largest employers in each of Virginia's counties, cities, and regions;
- a name and contact information for local employers of hundreds of different specific occupations.

[The Virginia Workforce Connection](#) website, run by the Virginia Employment Commission, includes information on Virginia's economy and labor market as well as resources for job seekers. The [Labor Market Information Tools](#) page has a wealth of resources. Scroll down to its "Industry" section and you will see a link to "50 largest employers." Click that, and you have the option to select a region or county and see its largest employers. Did you know that Virginia's top five employers are:

- U.S. Department of Defense
- Walmart
- Fairfax County Public Schools
- Northrop Grumman Shipbuilding
- Sentara Healthcare

You can also see where employers are located in your area on Google Maps. Here's a look at Albemarle county's top employers by location:

The [U.S. Department of Labor's Employer Locator](#) goes a step farther in connecting you to potential

partners. Although a bit clunky, it will eventually give you the names, locations, and contact information for employers in your county or city. You begin by choosing an occupation and industry that you're interested in. Then filter by your location and you'll be able to see up-to-date employer names. And with one more click, you can see a phone number or address where they can be reached. Here's the result of a search for companies that employ HVAC technicians in New Kent County.

Both the Employer Locator and VWC sites are extremely detailed; it can be difficult and tedious to work through all the steps. If you have problems navigating the sites, please contact: [Trailblazers](#) (434) 982-5582

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