Is the best second language Spanish, Chinese, Java, or Ruby?

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Our children won't be using Java, C++, Python, Ruby, or any of the other top 10 coding languages to chat with foreign strangers on trains in exotic locales. But these programming languages — used to develop mobile apps, analyze data, and perform other Internet business and marketing functions — may be the most important second, third, or fourth language your child will ever learn.

Learning computer science (CS) provides a golden opportunity in our children's future employment prospects. According to the Bureau of Labor Statistics, jobs in computers and information technology are expected to grow 12 percent from 2014 to 2024, adding 488,500 new jobs. These positions currently offer a median wage of $79,390, more than double the average of $35,540 for all occupations. Computer jobs are appearing faster than U.S. schools are preparing people to fill them; today an estimated half-million of such jobs are open.

Of course, not every child wants a career as a programmer, but learning coding is a valuable life skill for everyone. The ability to create a website or app for a business is a marketable skill for people in a range of careers, from advertising and public relations to jewelry designers and gamers. And it's exponentially prosperous: Apple sold $20 billion in apps in 2015, which is twice the amount they earned from apps just two years prior in 2013. Though perhaps less profitably, coding skills can benefit accountants, administrators, journalists, and security and data analysts, just to name few.

Even knowing just a little coding can help reduce the fear of technology, opening a mental window to understanding and using tech skills more broadly. There's also the argument, propounded by Steve Jobs himself, that coding "teaches you how to think." Many educators say coding can provide children with brain gains in information processing, logic, problem solving, experimentation, and creativity.

Unfortunately, only 10 percent of U.S. schools currently offer computer programming classes, reports Code.org and the Information Technology and Innovation Foundation. As a result, we're trailing most of the developed world.

Why the U.S. deficit in CS?

How far behind are we? When the Paris-based OECD Programme for International Assessment (PISA) last tested for digital literacy back in 2011, it ranked South Korea first, with New Zealand, Australia, Japan, Hong Kong, and Iceland close behind. The U.S. wasn't tested, but Ron Anderson, a University of Minnesota professor emeritus who has taught classes on the sociology of technology, says the "United States probably would have performed in the middle third of the countries."

At best, that's mediocre. But why? It's unclear, but it is clear that not much

attention was being paid to CS by schools, teachers, and students nationally. Take AP tests, for example. In 2014, students sat for 39,278 CS AP exams versus almost a million AP English exams. A survey by the Computer Science Teachers Association found that the percentage of high schools offering CS classes dropped from 78 percent in 2005 to 65 percent in 2009, while the percentage of AP computer classes fell from 40 percent in 2005 to 27 percent in 2009. According to the survey there were multiple reasons for the decline — none of them reassuring — including lack of teacher subject knowledge, difficult subject matter, lack of student interest, and lack of staff support.

Solve this conundrum: How is it that the U.S., the birthplace of Facebook, Apple, Microsoft, Google, and umpteen other computer science-inspired giants, lags in pumping out computer scientists?

Here's one answer: American universities offer excellent STEM graduate classes, but the majority are filled with foreign students. The National Science Foundation (NSF) *Science and Engineering Indicators 2014* report states that "foreign students earned … 51 percent of all computer science doctorates," even though only 5.6 percent of the students were foreigners.

Another reason is gender based. U.S. women are not exhibiting much interest in computer science. While 57 percent of U.S. college graduates are women, they only earn 18 percent of the computer science bachelor's degrees. Despite the fact that Augusta Ada King, the Countess of Lovelace, was the world's first computer programmer, computing in the U.S. is generally regarded as a "guy thing," — more so today than in the past. In fact, women's participation has plummeted in the last 32 years, ever since 1984, when 37 percent of computer grads were women.

Wake up! Let's code!

About five years ago, America started to wake up from its long CS slumber. In August 2011 came the launch of Codecademy. The site offered free coding tutorials and has attracted millions of students. On Jan. 5, 2012 Michael

Bloomberg, then New York City's mayor, tweeted his New Year's resolution to learn programming. On Jan. 17, 2012, Douglas Rushkoff presented his essay, *Why I Am Learning To Code and You Should, Too*, in his CNN column. Interest exploded, with pundits and media everywhere wrestling with the new question, "Should everyone learn to code?"

Rushkoff, author of *Program or Be Programmed*, became a leading digital crusader and a spokesperson for Codecademy. He argued that schools in the U.S. need to "begin treating computer code the way we do the alphabet or arithmetic." Rushkoff claimed there is such a dearth of skilled programmers in the country that firms like Google and Facebook buy entire companies simply to gain access to their code-literate employees. "If you know how to code, you can likely get a high-paying job right now," wrote Rushkoff in 2012. "You will be enabling America to compete effectively on both the economic and military frontiers, where we are rapidly losing our competitive advantage due to our failure to teach ourselves code."

Making sure our kids learn to code isn't just smart career planning, Rushkoff contended; it's practically a patriotic duty.

Next, President Obama entered the fray. At Computer Science Education Week 2013 he urged youngsters: "Don't just buy a new video game. Make one. Don't just download the latest app. Help design it. Don't just play on your phone. Program it. No one is born a computer scientist, but with a little hard work and some math and science, just about anyone can become one. … Just give it a shot."

Today, Codecademy has myriad competitors; Information Week lists multiple options, such as Plural Sight, CodeSchool, Treehouse, Hack Reactor, and MakerSquare. Even celebrities, including pro basketball player Chris Bosh, musician Will.i.am, comedian Jimmy Fallon and supermodel Karlie Kloss, are joining the call and urging young minds to learn coding. Kloss is especially persuasive; she claims "coding is a superpower" and she offers Kode with Karlie scholarships to young women around the world. Last

summer 21 girls learned Ruby and created Web apps via Kloss's empowering program.

Programming our future

Across the nation, many school districts are elevating their attitude toward CS. In California, the State Board of Education has proposed bills that would develop computer science standards for grades 1–12, and the University of California, Berkeley admissions department is being pressured to upgrade high school computer science classes from mere electives to the status of math courses, similar to statistics and calculus. In Iowa, the Department of Education intends to file a bill that requires all high schools to offer computer science courses by the 2018-19 school year. Louisiana, Massachusetts, Texas, and Virginia, already give special diplomas to students who matriculate with specific computer science credits.

The desire for CS classes is obvious. Arkansas governor Asa Hutchison signed a law in 2014 requiring public high schools in his state to offer computer science classes; enrollment more than tripled the following year.

Help has also arrived from outside school walls. As recently as January 2016, Seattle-based nonprofit Code.org announced it would team up with Birmingham-based A+ College Ready and invest $500,000 to train 50 Alabama computer science high school teachers to teach Advanced Placement courses.

Code.org also launched the global Hour of Code movement, a one-hour free tutorial in computer science that, they claim, reaches millions of students in more than 180 countries. Their mission is to demystify coding and present it as an accessible subject. Surveys at a Florida high school retrieved after a recent Hour of Code indicated that 360 students were interested in taking computer sciences classes the following year.

CS for geeks and nongeeks

Are there high schools where you can enroll your adolescent geek in excellent computer classes? Yes, there are. Champions at the American Computer Science League 2015 contests include Poolesville High School, Takoma Park Middle School, and Montgomery Blair High School, all in Maryland; Phillips Academy in Massachusetts, Dwight-Englewood School in New Jersey, and ACEPREP in Dublin, California. If you dwell in the Big Apple, the best bet could be the Computer Science Institute at John Dewey High School, offering a rigorous four-year program with an emphasis on JAVA.

Even if your child's high school doesn't offer any CS classes, you can still help your son or daughter learn what some have dubbed an essential 21st century skill. You can sign 'em up for immersive experiences such as InternalDrive's tech camps, which offer more than 100 locations for kids ages 7 to 17. If these tuition prices are beyond your budget, free online options can be accessed at home, such as Khan Academy, MIT open courseware, Codecademy, and many others.

No matter how you do it, keep the ultimate goal in mind: your child's future. How bright are the chances of future employment for CS specialists? According to the U.S. Bureau of Labor Statistics, in 2014 the average salary for software developers was $97,990, and for computer and informational research scientists it was $108,360. To stay current, check out the best programming language to learn in 2016.

Finally, it's worth remembering that not every child has what it takes to be a computer scientist. Not only are strong analytical and problem-solving skills essential, but it also helps to be detail-oriented and to have a crackerjack memory. Most importantly, before you engineer an education makeover for your child, make sure your child is as excited by the prospect as you are.

Still, everyone could use a demystifying lesson in basic coding — it'll help in the long run.

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