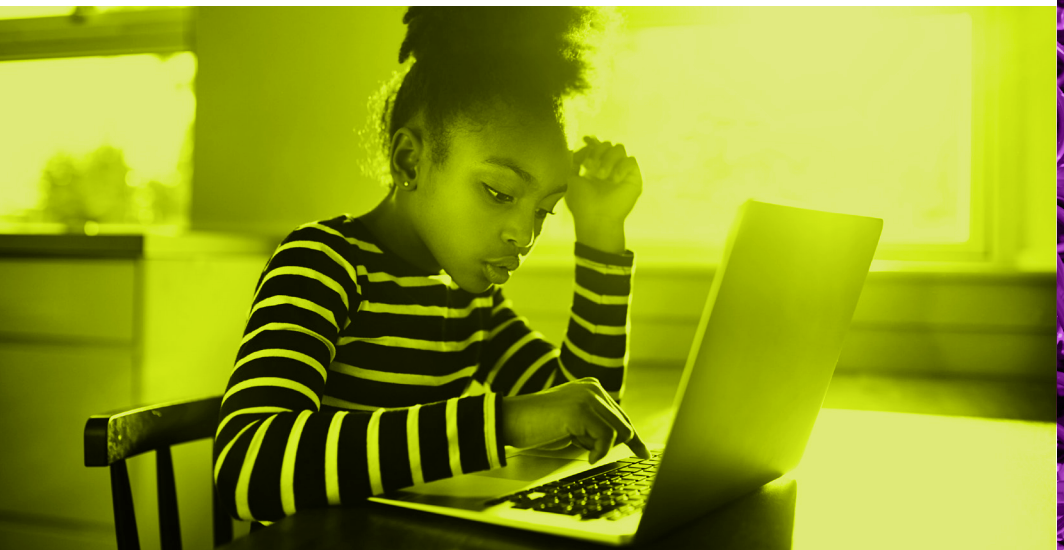
CompTIA

Make Tech Her Story

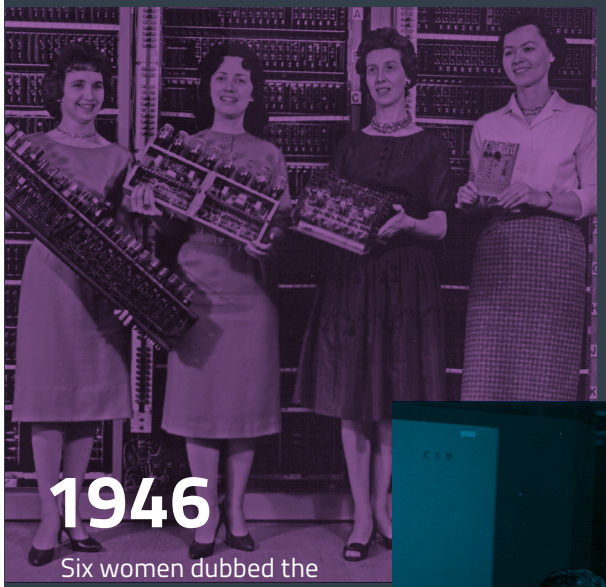
What Needs to Change to Inspire Girls' Pursuit of IT Careers



Before there was cloud computing, Big Data or the Internet of Things—when the information technology (IT) field was still coming into its own—women were at the forefront. As early as 1946, six women dubbed the "ENIAC girls" programmed the first all-electronic computer on behalf of the U.S. Army during World War II.[1] A few years later, U.S. Navy Rear Admiral Grace Hopper led a team that developed Flow-matic, a programming language that became the precursor to COBOL.[2] In the 1960s, it was a woman, Margaret Hamilton, the director of software engineering for MIT's Instrumentation Laboratory, who oversaw the team tasked with developing flight software for NASA's Apollo space mission.[3]

Despite these early pioneers, women's representation in the IT industry peaked at 36% of the sector's workforce in 1991 and has declined steadily since then. By 2015, women held less than 34% of technology occupations.[4,5] That same year, women held almost 47% of life, physical and social sciences occupations; 65% of community and social service occupations; and 73% of education, training and library occupations.[6]

Today, at a time when technology is essential to our global infrastructure, economy and security, we need all hands on deck. Nine in every 10 HR professionals are already challenged to fill IT job openings in their organizations, and U.S. employers are projected to create nearly 600,000 new core IT jobs by 2024.[7,8] The increasingly critical nature of IT across industries, governments and our personal lives underscores the problematic nature of this talent shortage—and the dire need for skilled men and women who can fill these positions.



1946

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1960s

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2025

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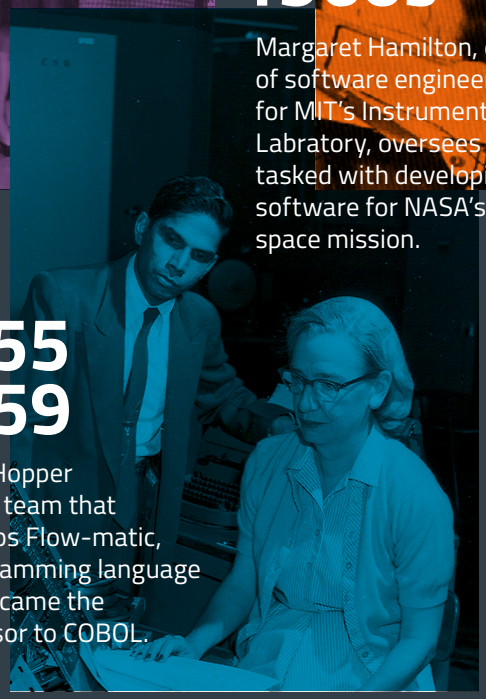

1955 –59

Grace Hopper leads a team that develops Flow-matic, a programming language that became the precursor to COBOL.

1991 –2015

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A NEW WAY OF FRAMING THE CONVERSATION

A call for women to enter the IT workforce echoes a similar call made to women in the past. During World War II, the iconic Rosie the Riveter campaign galvanized women to join the workforce and the war effort. The campaign inspired a social movement that increased the number of working American women from 12 million to 20 million by 1944, a 57% increase from 1940.[9] Now more than ever, we need a presence like Rosie's. An icon that rallies us all to contribute to making the IT industry inclusive, and stronger because of it.

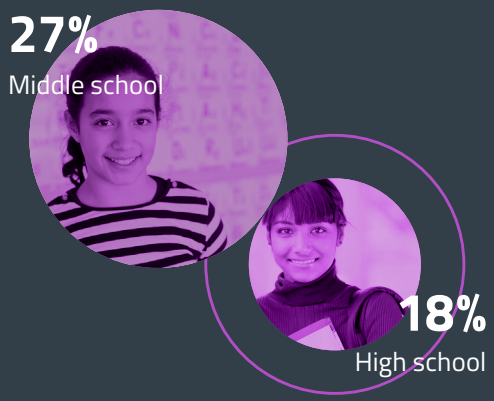
Conversations about creating gender parity in IT professions aren't new. Industry leaders, educators and the media recognize that attracting women to the field depends largely on encouraging them to think about technology subjects and careers at a young age. But beyond making this connection, few have uncovered specific reasons why girls aren't drawn to IT. In fact, some feel the conversation stops there. As one Forbes contributor commented, "The real reason why there are so fewer women in tech...is that most women clearly aren't as interested in technology-related work as men are."[10]

There's more to the story.

During the summer of 2016, CompTIA, the voice of the information technology industry, commissioned research that brought the conversation directly to girls and boys between the ages of 10 and 17 in hopes of clarifying what drives or detracts from their interest in IT, and what needs to change in order to tip the scales.

01

Girls' consideration of IT careers wanes with age.



Less than one-quarter (23%) of girls have considered an IT career, compared to 47% of boys. Whereas 27% of girls in middle school (10–13 years-old) have considered an IT career, this drops to 18% among high schoolers (14–17 years-old).

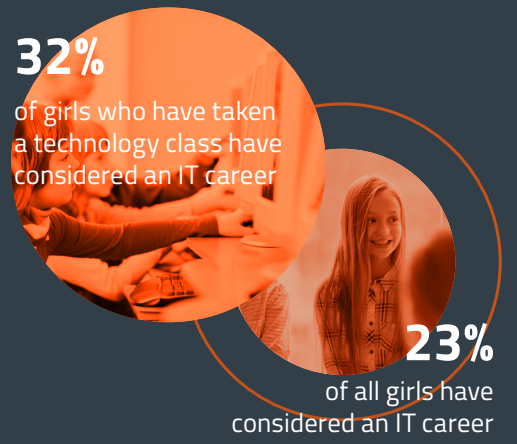
02

Information precedes interest

Of girls who haven't considered an IT career, 69% attribute this to not knowing enough about what IT jobs involve—suggesting that lack of interest alone isn't the main reason why girls aren't drawn to the field. 53% of girls say that more information about the breadth of available jobs would encourage them to consider IT.

03

Technology classes aren't a perfect solution



Girls who have taken a technology class are only slightly more likely to have considered an IT career (32%). Similarly, less than half of girls who've taken these courses feel their skills would be right for an IT job.

A Growing Gap

"I just can't really see myself doing anything with technology. It doesn't really interest me."

Today's middle and high school students are the first generation to have literally grown up with mobile devices, cloud apps and social media. Often referred to as "digital natives," these boys and girls are far from strangers to consumer technology.

Across both genders, 88% use smartphones and 95% use computers (laptops or desktops) at home, school or both. Boys' and girls' early awareness of IT is framed by the devices they use, but not necessarily the concepts that power them. When prompted to offer words they associate with technology, girls think in terms of gadgets and the activities they facilitate, such as "computers," "iPhones," "internet" and "social media."

Being a fluent technology user, as so many boys and girls now are, doesn't equate to grasping the ideas behind IT (i.e., data, networking or security)—let alone having an interest in its career paths. Case in point: only half of all students know what IT stands for, boys slightly more so than girls (55% v. 44%, respectively.)

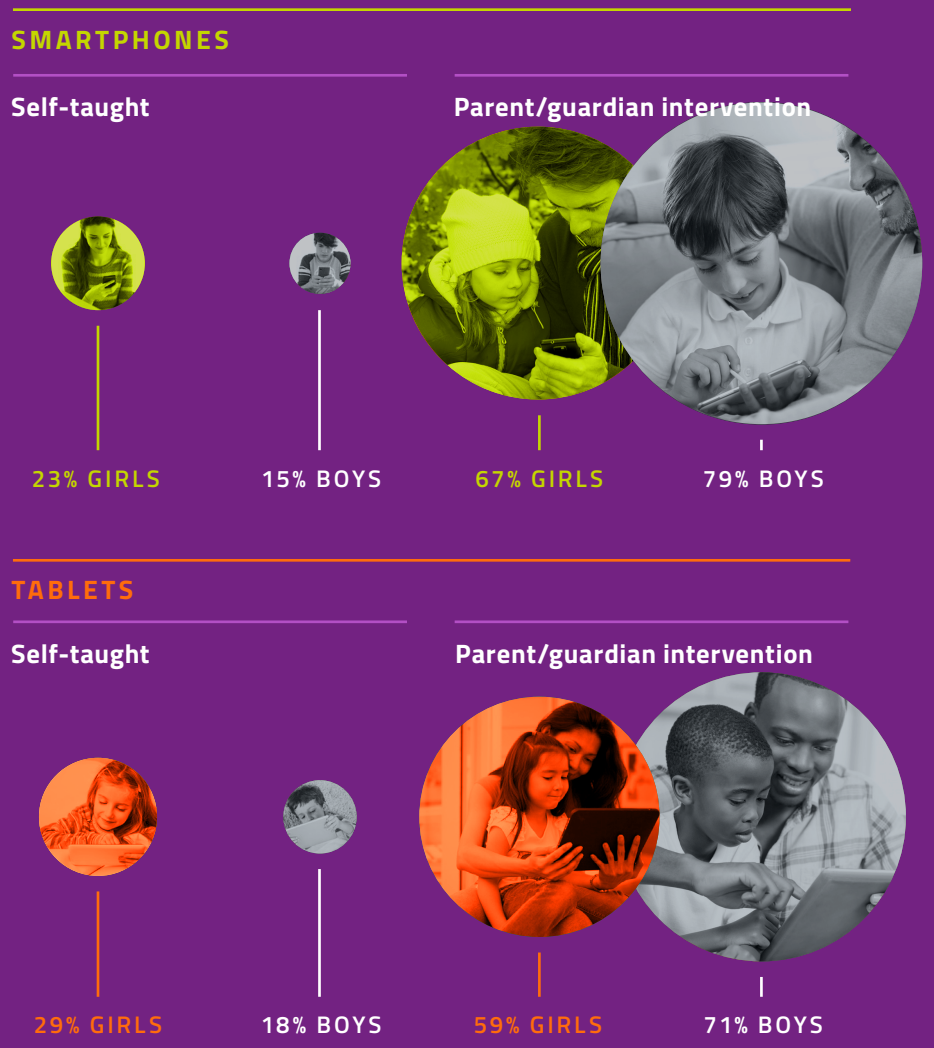
Looking closer at interest in technology as a school subject and possible career path, the divide between boys and girls becomes clear. Consistent with prior research, 47% of boys have considered an IT job, double the 23% of girls who have done the same. Fifty-five percent of boys rank technology as one of their favorite subjects in school, again almost twice the amount of girls who do so (29%).

PARENTS' ROLE IN INTRODUCING TECHNOLOGY

For digital natives, learning about technology begins at home. A comparable number of girls (33%) and boys (38%) agree that parents and guardians are the primary source for finding out what IT stands for. But when it comes to navigating a smartphone or tablet for the first time, girls are more likely to go at it alone.

Whether intentional or the result of unconsciously internalized gender stereotypes, these nuances in parental support may play a part in shaping sons' and daughters' technology behavior.

Boys, for example, are more likely to begin using mobile devices as young as five years-old or earlier (11% v. 5% of girls). They're also slightly more likely to explore the innards of their devices—like the system boards, sensors and RAM—out of curiosity (36% v. 30% of girls), a habit that parental encouragement can easily promote.



As students transition from middle to high school, this gap becomes even more pronounced. For one-third of middle school girls, technology is one of their favorite subjects; for high school girls, just 24% feel the same way. And while few girls aspire to IT-specific job titles, their minor interest drops off as they get older.

The intention of this study is to probe deeper into this divide, uncovering the specific forces that stifle girls' enthusiasm for IT and what might be done to address them.

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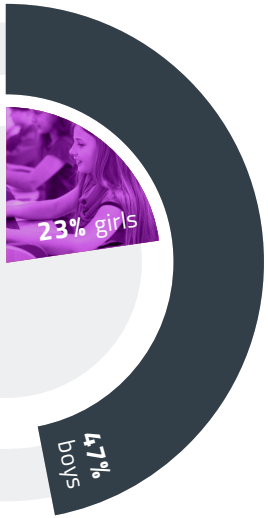
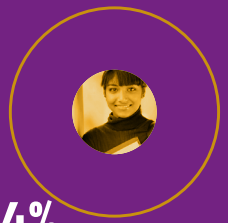


INTEREST IN **IT** JOB TITLES BY GENDER, AGE

Programmer

7% GIRLS
25% BOYS

10%
Middle school girls
10–13 years-old

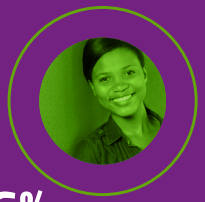


4%
High school girls
14–17 years-old

Computer Specialist

8% GIRLS
23% BOYS

9%
Middle school girls
10–13 years-old



6%
High school girls
14–17 years-old

Software Developer

5% GIRLS
23% BOYS

7%
Middle school girls
10–13 years-old

3%
High school girls
14–17 years-old

Why IT Doesn't Translate to "Dream Job"

"It's just never something I thought of or wanted to do."
"I wouldn't be able to just sit there at a computer for eight hours."

When it comes to the criteria girls use most to determine future career possibilities, IT jobs fit the bill. The problem is, most girls haven't made the connection.

More than half (59%) of girls look forward to landing jobs where they can earn a lot of money and help other people (55%). Other factors such as making a difference and doing something they love rank highly for girls of all ages. People who work throughout the IT industry today—whether they're app developers at Fortune 500 corporations, public sector security engineers or the CIO of a non-profit organization—know that IT jobs can satisfy these desires. In 2015, for instance, the average annual wage for jobs in the U.S. technology industry was $105,351—more than double the average across all private sector occupations.[11] Most girls, however, have little insight into what these jobs involve, interfering with their ability to align them with their personal interests.

Rather than envision IT in their futures, girls' interest often lies with more creative fields such as music, art and journalism, and professions that directly check off the "help other people" box, including teaching and nursing. These preferences don't stem so much from an aversion to technology, but rather girls'

limited perspective of IT careers. Asked to provide examples of specific IT jobs, girls' answers range from extremely general ("working with computers," "inventing" or "fixing gadgets") to hyper-focused on consumer products ("Apple Store salesperson" or "Best Buy Geek Squad.") In addition to harboring a narrow view of available IT jobs, girls frequently home in on the misconception that to work with technology means to be isolated and sedentary, operating alone in front of a screen for 40 hours each week.

"There is more to technology opportunities that we don't know."

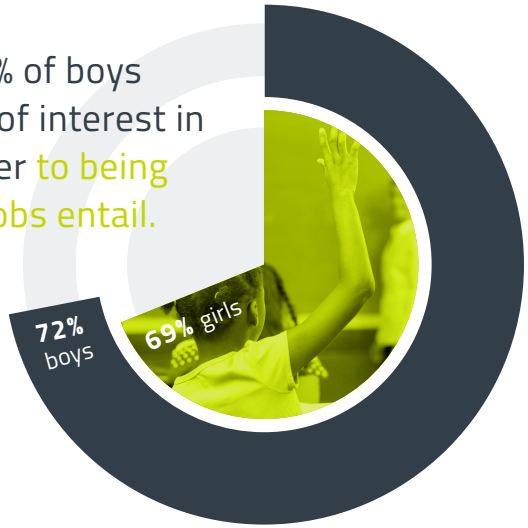
Chalking up girls' disinterest in IT jobs to their natural preference for other subjects (and vice versa, pinning boys' attraction to IT jobs on their inherent love of technology) is too simplistic. All students, but particularly girls, don't know what IT and IT careers involve—which prevents them from recognizing that their skills and aspirations would take them far in the field.

REAL TECH JOB TITLES THAT MATCH WHAT GIRLS WANT IN A CAREER

- INFORMATICS NURSE
- E-LEARNING DEVELOPER
- VISUAL JOURNALIST
- WILDLIFE TECHNOLOGY ENGINEER
- INTERACTION DESIGNER
- MUSIC DATA SCIENTIST
- E-COMMERCE ANALYST
- RETAIL SUPPORT ENGINEER

Among all students who are not interested in pursuing an IT career, 69% of girls and 72% of boys attribute this to being unsure of what IT jobs entail. As one middle school girl expressed, "I don't think I've really learned about different types of technology jobs. When we think of technology we think of computers and programming, but there is more to technology opportunities that we don't know."

69% of girls and 72% of boys attribute their lack of interest in pursuing an IT career to being unsure of what IT jobs entail.



Given girls' vague understanding of the range of IT jobs (not to mention their preconceived notions of IT workers' day-to-day), it should come as little surprise that almost half (45%) don't know if they have the skills to succeed in these occupations.

Correcting the IT gender gap starts with addressing girls' knowledge gap. According to 53% of girls, having more information about the breadth of available jobs would be most valuable to encouraging them to consider IT. Information can come from a variety of sources, be it the media, family, teachers or community groups. Not to be discounted, however, is the importance of knowing someone—a parent, relative, mentor or role model—who can inspire by example. Only 37% of girls today know a relative or friend with an IT job, but among the small subset of girls who have considered an IT career, this rises to 60%. Girls can't dream about working in a field they know little about. Having a close friend or family member who works in IT gives girls a reference point for jobs they might otherwise overlook, making these career paths appear attainable rather than unthinkable.

37% of girls today know a relative or friend with an IT job, but among the girls who have considered an IT career, this rises to 60%.







REAL WOMEN WORKING IN IT

DOES SHE OR DOESN'T SHE (WORK IN IT)?

In June 2016, CompTIA commissioned the Blackstone Group to speak directly with young girls about their perceptions of technology. The Blackstone Group conducted four focus groups with 37 girls between the ages of 10 and 17 to gauge what they know, think and feel about technology overall, and as a future career path. Each focus group discussion included an interactive group exercise intended to capture what girls think an IT professional really looks like.

The focus group moderator sorted the girls into small teams and provided them with seven pictures of real women. Each team was asked to select which pictures they felt were of women who work in IT, and explain why they made their choices. **Ultimately, none of the teams accurately identified that all seven women were IT professionals**—from a public sector CIO to a security engineer for a major technology brand—something the moderator "revealed" after each group discussed their selections.

Across groups, the girls were surprised to learn that each of these women, who represented a range of ages, ethnicities, job titles and even office dress code, held IT jobs. More unexpected than the fact that all seven women worked in IT, however, was realizing the range and diversity of IT careers.

As one high schooler commented, "I don't think we're educated enough [about] what jobs are available in that field. If you asked me what jobs, I would have never told you any of those job titles. I don't know that. We think of technology as hands-on fixing things, [not] all these different things that you could go into that would grab our attention."

The State of In-School IT Curriculum

"It was terrible. I couldn't tell you what I learned from that class."

In response to public and private sector initiatives, the U.S. education sector is gradually expanding its emphasis on science, technology, engineering and math (STEM) curriculum. As of August 2016, 31 states including the District of Columbia allow computer science to count toward high school math and science graduation requirements.[12]

Although most boys (71%) and girls (61%) claim to have taken some form of "technology" class by the time they're in high school, the term is interpreted loosely across school districts.

For some, a technology class may focus on keyboarding or learning how to use mobile devices or basic software; for others, technology may be a means to an end, such as graphic design or video production. In even fewer instances, these courses introduce foundational aspects of computer science and information technology. Given this wide range, the efficacy of current technology classes (in terms of encouraging interest in IT careers) is very much up for debate.

A 2016 Information Technology & Innovation Foundation analysis concluded that technology education in the U.S. has been slow to evolve with the IT industry, and many course objectives still point toward basic technological literacy rather than a comprehension of computing concepts.[13]

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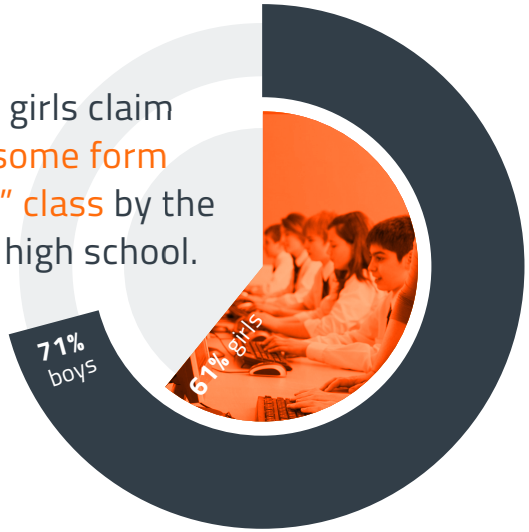


A handful of girls we interviewed expressed taking technology classes that touched on coding, programming or engineering, but most described activities tangential to IT, such as using iMovie, designing their school's yearbook, editing photos, typing, or even learning to fill out online job applications. Coursework that rehashes the same skills girls pick up from their own regular technology use does little to expand their IT horizons. As one high school girl described her technology class, "I didn't learn anything that I didn't already know. I feel like it was an easy class. It was a requirement class."

There is a correlation between exposure to technology classes and girls' inclination to consider IT careers, but curriculum alone does not fully reinforce that their skillsets would translate to these jobs.

Thirty-two percent of girls who have taken a technology class have also thought about pursuing an IT career, slightly more than 23% of girls on average. Contrary to the notion that only students with a knack for math and science go on to pursue technical roles, we found that girls who have considered IT jobs are more likely to cite reading (73%) as their strong suit than girls overall (53%).

Compared to boys, girls are also more likely to leave technology classes feeling like their skills don't set them up for a future in IT. Of students who have taken these courses, only 45% of girls feel their talents qualify them for IT careers later on, compared to 65% of boys.

"I'm guessing teachers don't even know all of these jobs exist."

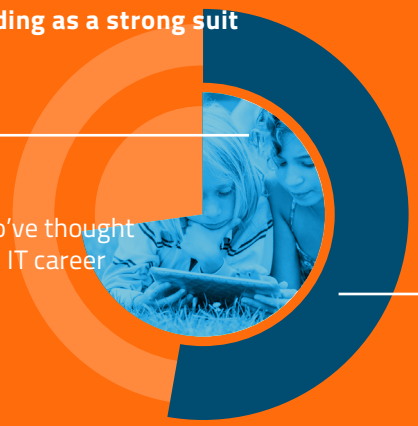
Any curriculum is only as powerful as the teachers who communicate it. Despite school districts' push for more technology curriculum, there is a shortage of teachers equipped with the expertise to lead these classes.

A shortfall of trained educators has already become a roadblock for schools trying to navigate their computer science goals. Experts note that the race to prepare teachers will be a deciding factor in whether or not Chicago Public Schools, one of the first districts to make a computer science commitment, meets its deadline to require computer science for the class of 2020.[14] Compounding the issue, there is no standardized "track" to becoming an IT educator; training and certification requirements vary drastically across jurisdictions. Currently, only two states and the District of Columbia require computer science certification or licensure in order to teach these courses.[15]

Without teachers well-versed in technology as a subject, let alone a springboard for future jobs, IT careers are unlikely to show up any brighter on girls' radars. Girls are more likely to rely on teachers to discuss their post-graduation plans than boys (31% v. 25%). This is especially true for girls who have contemplated IT careers (44%). Teachers must have the knowledge and resources to lead IT classrooms before being able to effectively "plant the seed" that gets girls excited about working in the field.

GIRLS WHO'VE CONSIDERED AN IT CAREER VS. GIRLS OVERALL

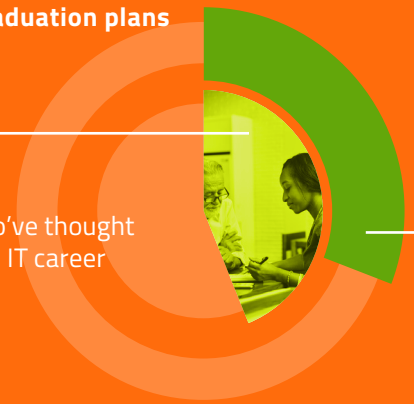
Cite reading as a strong suit



73%
Girls who've thought about an IT career

53%
All girls

Reliance on teachers to discuss post-graduation plans



44%
Girls who've thought about an IT career

31%
All girls

Conclusion

Inspiring girls to pursue IT careers later in their lives isn't simply a matter of deconstructing gender stereotypes. It's essential to the successful future of global businesses, economies and infrastructure. Arguing that girls don't flock to IT jobs because they don't like technology as much as boys do misses the point.

Disinterest in IT doesn't manifest by chance. As this research illuminates, we can't even think of attracting girls to IT jobs if they're uninformed. We take for granted that young people today are fluent in all things technology. Yet, there's a critical difference between being a confident technology user and recognizing the principles and skillsets that power our tablets and apps, not to mention our financial institutions, transportation infrastructure and global supply chains. Knowing how gadget savvy boys and girls are, the adults around them should not assume they're too young—or too intimidated—to explore fundamental IT concepts and career options.

Early in life, we internalize common ideas of the jobs we could grow up to have: doctor, teacher, lawyer, scientist. The onus falls on parents, educators and other role models to make sure developer, information security professional and IT manager make it into the mix. Consider this memory from one high school girl:

"I can remember being in the first grade, when I was asked that question…'What do you want to be when you grow up?' Half the class said vet, the other half said police officer. A couple girls said mom…No one ever said, 'I want to be a technological engineer' or 'I want to be a security processor' and I think if we are introduced to that setting earlier on, then I think the avenue would be perceived as more open."

School curriculum is another important component for normalizing IT. That said, IT education in its current state is not yet a surefire solution to bringing girls and women into the fold. Most technology courses continue to reinforce a limited range of computer skills, failing to make a direct connection between what's learned in the classroom and what capabilities people need to work in IT. Even as individual cities and states pursue efforts to expand technology coursework and professional development for educators, there is still no standardized track to becoming an IT teacher. Subsequently, many of those called on to lead IT-focused classes aren't equipped with the skills they need to be effective.

What girls, and all young people, need most of all is information—not only from the media or other content they consume online, but information that's reinforced by adults in their immediate circles. Whether you're a parent or guardian, community leader, teacher or active IT professional, there are different ways each of us can help highlight the breadth of possibilities IT offers:

PARENTS AND GUARDIANS

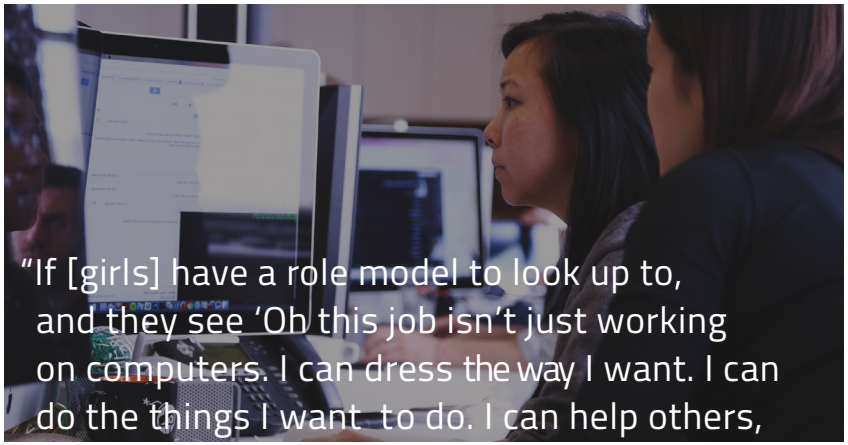
"[To rally more girls to consider IT] have more encouragement, more people. I didn't really have that, and just looked it up and did my own research, and figured out that's what I wanted to do."

Whether they work in IT or not, whether they know the ins and outs of cloud computing or not, parents and guardians can still champion their daughters' interest in technology and IT careers. This means not only making it a point to use technology with our children (even if it's researching a homework assignment online, or downloading a podcast to listen to together from a tablet), but also encouraging a deeper curiosity in the devices they use regularly. It's never too early to weave IT into ongoing conversations about what young girls may want to be when they're older. Resources like CompTIA's Career Resources break down the IT industry and its diverse career possibilities into digestible messages that parents and guardians can repeatedly convey to their children.

TEACHERS AND OTHER EDUCATION PROFESSIONALS

"Today I've learned different things that are possible in technology careers [that] I didn't know before. Maybe if you knew exactly what opportunities were out there, that might help."

In some ways, teachers have to pick up where parents leave off, clarifying the range of job titles and functions that fall under the broad label of IT. Understanding that everyone has unique qualifiers for what they want in a job, teachers must show students that working in IT isn't a choice between inventing the next iPhone or helping configure laptops at Best Buy. With the term "STEM" dropped widely throughout classrooms today, teachers must help girls debunk the notion that sharp math and science skills are the only prerequisites for IT success. Educators specifically charged with teaching IT also need to be mindful of connecting ideas shared in the classroom to real-world applications and challenges. Organizations such as the Computer Science Teachers Association provide resources to guide educators' own IT professional development, along with framework and materials to shape IT curriculum within their schools.



"If [girls] have a role model to look up to, and they see 'Oh this job isn't just working on computers. I can dress the way I want. I can do the things I want to do. I can help others, work with people and earn good money.'"

As this research illustrates, one of the most influential sources of IT information is the people already doing these jobs. Women who serve as programmers, network administrators, system architects and chief technology officers have an opportunity to share their stories. Simply communicating what you do in your professional day-to-day, or describing the road you traveled to an IT career, provides girls with visibility into a world they vaguely know. These first-hand experiences can go a long way toward expanding girls' narrow perceptions of IT employees, demonstrating that these jobs don't exist solely in windowless rooms—nor do they require sitting in solitude for eight hours a day. Dream IT, a program launched by CompTIA's Advancing Women in IT community, offers a way for women in these occupations to connect with and inspire girls in their local communities to explore IT. TechGirlz is another organization that offers free materials IT professionals can use to lead local workshops that educate girls about a variety of topics, from Python to app development.

When you're 10, 13, 17 years-old, perception is very much reality. If we want girls to envision themselves as IT professionals, we need to all play a part in changing how they see IT.

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METHODOLOGY

In June 2016, CompTIA commissioned the Blackstone Group to conduct qualitative and quantitative research that explored girls' and boys' technology habits, awareness of IT and perception of IT careers.

For the qualitative portion, the Blackstone Group held four focus groups on June 8 and 9, 2016, in Schaumburg, IL, with a total of 37 girls. Two groups included middle school girls between 10 and 13 years-old; the other two groups included high school girls between 13 and 17 years-old. Participants were recruited from a range of public, private and home-school settings, representing a mix of ethnicities, residences and household incomes. The Blackstone Group contacted participants' parent/guardians and obtained signed consent, and spoke directly with the girls, before recruiting them for the project. A Blackstone Group moderator led the focus group discussions, based on a guide developed in collaboration with CompTIA.

Between June and July 2016, the Blackstone Group conducted an online quantitative survey of 200 girls and 200 boys between 10 and 17 years-old. The Blackstone Group recruited a nationwide sample with quotas for age, region and race/ethnicity. CompTIA developed the questionnaire with input and review from the Blackstone Group.

ABOUT COMPTIA

The Computing Technology Industry Association (CompTIA) is a non-profit trade association serving as the voice of the information technology industry. With approximately 2,000 member companies, 3,000 academic and training partners, 90,000 registered users and more than two million IT certifications issued, CompTIA is dedicated to advancing industry growth through educational programs, market research, networking events, professional certifications and public policy advocacy. To learn more, visit **CompTIA online**, **Facebook**, **LinkedIn** and **Twitter**.