CRACKING
THE GENDER
CODE

GET 3X MORE WOMEN
IN COMPUTING

A research report
produced jointly by

accenture

girls who
CODE

ACT NOW

The gender gap in computing is getting worse and has severe implications for the U.S. economy.

New research by Accenture and Girls Who Code shows that the share of women in computing jobs is in decline and suggests that universal access to computing in schools will not address the gender gap. Only by tailoring courses to girls' specific needs can we boost their commitment to computing.

This report recommends a fresh approach that could increase the number of **women in computing to 3.9 million by 2025**. That would lift their share from **24% to 39% of the computing workforce** and generate **$299 billion in additional cumulative earnings**.

The greatest impact will come if we act now, starting with girls in junior high school and sustaining their interest throughout their education.

HOW DID WE GET HERE?

The "Fourth Industrial Revolution" is transforming the world of work. Just as it happened with the technologies of the steam, electricity and computer revolutions, digital technologies are now becoming pervasive and reshaping all parts of the global economy.

The computing industry's rate of job creation in the U.S. is now three times the U.S. national average.[1] This rapid expansion of the computing workforce means that computing skills – with coding at the core – are the most sought-after skills in the American job market.

Yet amid this boom, research by Accenture and Girls Who Code shows that women's share of the U.S. computing workforce is declining. On current trends, women will hold only one in five computing jobs in the U.S. by 2025. This is a national crisis with severe implications for America's place in the global economy and for the future of women.

This report summarizes findings from the research by Accenture and Girls Who Code. The project included a large-scale survey of girls aged 12-18 years old, undergraduate college students, and other key stakeholders to understand the state of girls' interest in computing at each stage of their education. It also includes recommendations on what America can do to close the gender skills gap in computing, better meet the needs of a rapidly changing job market, and improve U.S. competitiveness.

The keys to improvement include: sparking the interest of girls in junior high school, sustaining their commitment in high school where early gains are often lost, and inspiring college undergraduates by reframing computer curriculums. Implementing our recommended strategy focused on these three stages of education could help to more than triple the number of women working in computing in the U.S. to 3.9 million by 2025. In turn, this could boost women's cumulative earnings by $299 billion over the next 10 years.

The problem starts in the classroom

The challenges we face originate in school, where too few girls are pursuing studies in computing and related subjects. According to the American Association of University Women, in recent years only 20% of Advanced Placement (AP) computer science exam takers in high school have been female, compared to 48% for calculus, 59% for biology, and 34% for physics.[2] And the proportion of female students majoring in computing in college is not just low – it has fallen dramatically. In 1984, 37% of computer science majors in the U.S. were women. Today, only 18% are.[3]

Various campaigns and school curricula have set out to boost the interest of children and young adults in computing. However, some of these efforts take little account of the causes of the gender imbalances. Our research suggests that universal access to computer science risks reinforcing – rather than resolving – these imbalances. It also shows that exposure alone is insufficient to increase the proportion of girls pursuing computer sciences. It is therefore vital that courses and other programs are tailored to meet the needs of girls.

This report foresees significant potential growth in women's participation in computing. More than two thirds of this would result from working with today's junior high school girls and from sustaining their interest in computing as they progress through their education. That means we need to act urgently if we are to reverse today's alarming trends.

The skills squeeze and its impact on the U.S. economy

The shortage of women in computing is a fundamental economic challenge for the U.S. economy and our long-term global competitiveness.

While computing jobs in the U.S. are growing at three times the rate of overall job creation – rising at 4.6% compounded annually between 2011 and 2015, vs. 1.5% for employment across all industries[4] – supply is failing to meet demand. In 2015 there were more than 500,000 open computing jobs in the U.S.,[5] but as recently as 2014, fewer than 40,000 new computer science graduates.[6] More broadly, WhiteHouse.gov estimates that there could be 2.4 million unfilled science, technology, engineering, and math (STEM) jobs in the U.S. by 2018.[7]

The scale of the challenge is all the greater because computing is increasingly enabling the application of new technologies – from analytics to automation – that are driving the adoption of transformative digital business models in all industry sectors. The associated new computing skills are increasingly specialist – richer, more complex and more relevant to each sector. Therefore, this skills challenge is not merely about an aggregate shortage, but about the need to match talent precisely to specific requirements.

As a measure of these changes in our labor market, the World Economic Forum's January 2016 report *The Future of Jobs*[8] estimates that 65% of children entering primary school today will ultimately end up working in completely new jobs – jobs that don't yet exist. In the face of such profound change, the current imbalances in the U.S. labor market will make it far harder and more expensive for American businesses to meet their hiring needs.

In fact, these strains are already emerging. The WEF's Future of Jobs[9] report comments: "Net job growth and skills instability result in most businesses facing major recruitment challenges and talent shortages, a pattern set to get worse over the next five years."

A less responsive labor market threatens our competitiveness

The computing skills shortage will result in project delays, higher wage costs, more time and money spent searching for qualified employees and a greater need to retrain current ones. This will impact the ability of American businesses to innovate and bring new products and services to market swiftly.

We need to face the facts. While the U.S. is clearly the global leader in digital innovation today, that dominance is by no means assured. As technology continues to bring down barriers and introduce new business models, we must prepare to face greater and more intense competition from around the world.

"Computer science gives you a foundation that you can take with you to pretty much any field that you're interested in and be sure to have reliable employment."
YOUNG WORKER, NEW YORK

The problem and the solution lie in our future workforce. Accenture research shows that 40% of women in the U.S. say they are not interested in working in computer science or information technology (IT). This compares to 25% in emerging markets. This may be related to the fact that only 52% of workers in the U.S. believe that today's education system effectively builds young people's skills in computer science and IT. That compares to 66% of workers in emerging markets and 78% in India.

In many emerging markets, female participation in computing is higher than in the U.S. In India, 37% of computing and business process management workers were women in 2015.[10] As it moves up the value chain in IT, women will likely make up an even higher proportion of its computing workforce.

Within the high growth area of analytics for example, the U.S. has a shortage of professionals, while China and India have a surplus. In fact, the U.S.'s shortfall is greater than the surplus in India and China combined.[11]

"The best [bit] of my job is definitely coding... as the job demands grew, it was a really important step in making my design work more valuable..."
YOUNG WORKER, NEW YORK

Looking ahead, the U.S. must be prepared to face more intense competition from countries that have more tech-savvy workforces. Unless the large and relatively untapped source of female talent is engaged, the U.S. will be less able to face that competitive challenge.

Bringing women back to the center of our economy

While these dislocations in the job market will present serious long-term issues for all U.S. businesses, they also have a direct impact on working opportunities for individual women.

If nothing is done to change the current trends, young women will lose the race for the high-value, high-productivity jobs at the heart of the digital economy. As a measure of the current lack of progress, our analysis reveals that the salary gap between men and women in U.S. computing roles has widened in recent years from $8,540 in 2011 to $12,661 in 2015.

However, this problem also presents an opportunity. As Accenture noted in its earlier study, *Getting to Equal — How Digital is Helping Close the Gender Gap at Work*,[12] digital fluency acts as a powerful accelerant at every stage of a woman's career. If our young women are given the chance to develop world-leading computing skills and apply them at U.S. companies, then they will be at the center of our thriving new digital economy.

THE OPPORTUNITY BEFORE US

It is widely acknowledged that to have the greatest impact, efforts to attract women into computing must start at the earliest stages of a girl's educational life – at junior high level or even earlier. Against this background, our new research study offers a fresh approach to the debate and a valuable new perspective. Through a blend of both qualitative and quantitative analysis, we have identified which factors at each stage of a girl's educational journey through junior high, high school and college makes the most difference to their desire to study and work in computing.

Catching girls early in junior high school

According to our research, 69% of the growth in the computing pipeline would come from changing the path of the youngest girls – especially those in junior high school. As Figure 1 shows, experience of computing in their junior high years means that girls are 18% more likely to show interest in computing throughout their high school and college years.
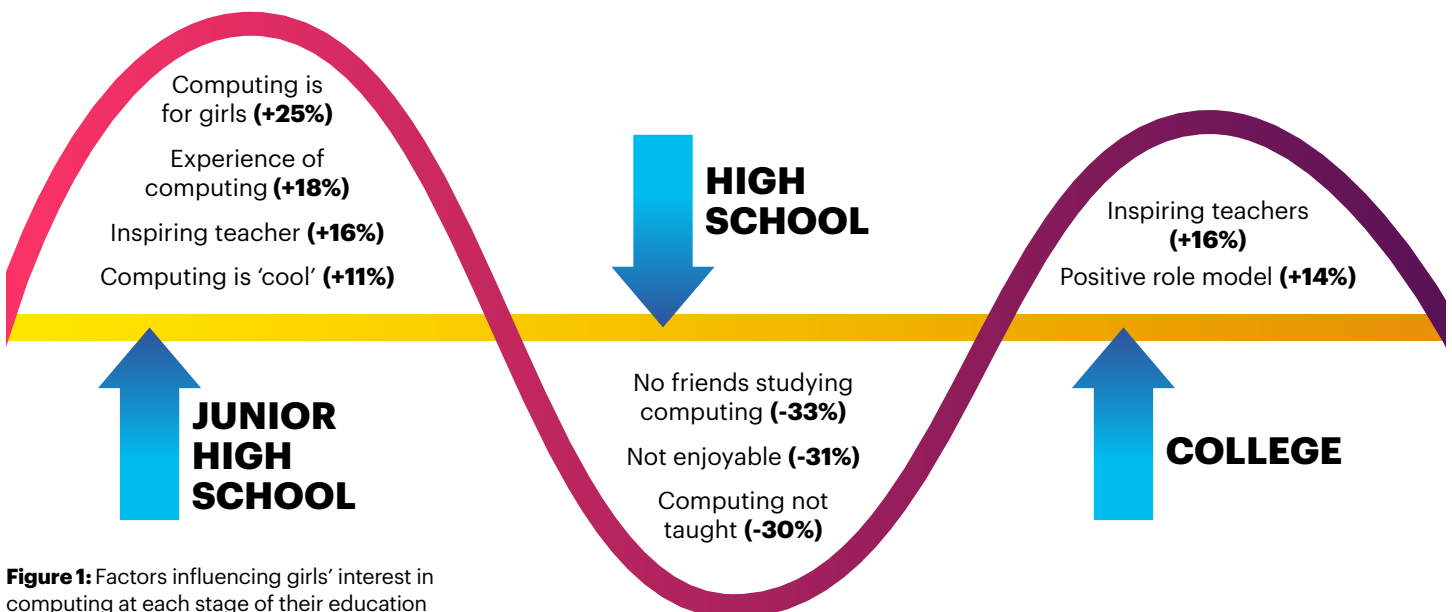
Avoiding the "high school trap"

Gains made among girls in junior high school can easily be lost in high school. A number of factors negatively impact interest. For example, not having friends in a computing class can reduce by 33% the likelihood of a girl studying the subject at college. So extra efforts are needed to sustain girls' interest at this stage.

Realizing that the door to computing never closes in college

College years are not the last chance to convert young women to computing because, as the study reveals, the door into computing never closes. More than half – 58% – of women working in computing who went to college did not major in computing as undergraduates. When college women realize how they can put computing skills to work in almost any career, they become more open to the subject as an option.

As Figure 1 shows, we found that the principal factors that influence interest in computing tend to be positive for girls at junior high and college, and tend to be negative during high school years. These unique insights have enabled us to recommend a strategy that is precise, sequenced, and targeted for each stage of their journey.
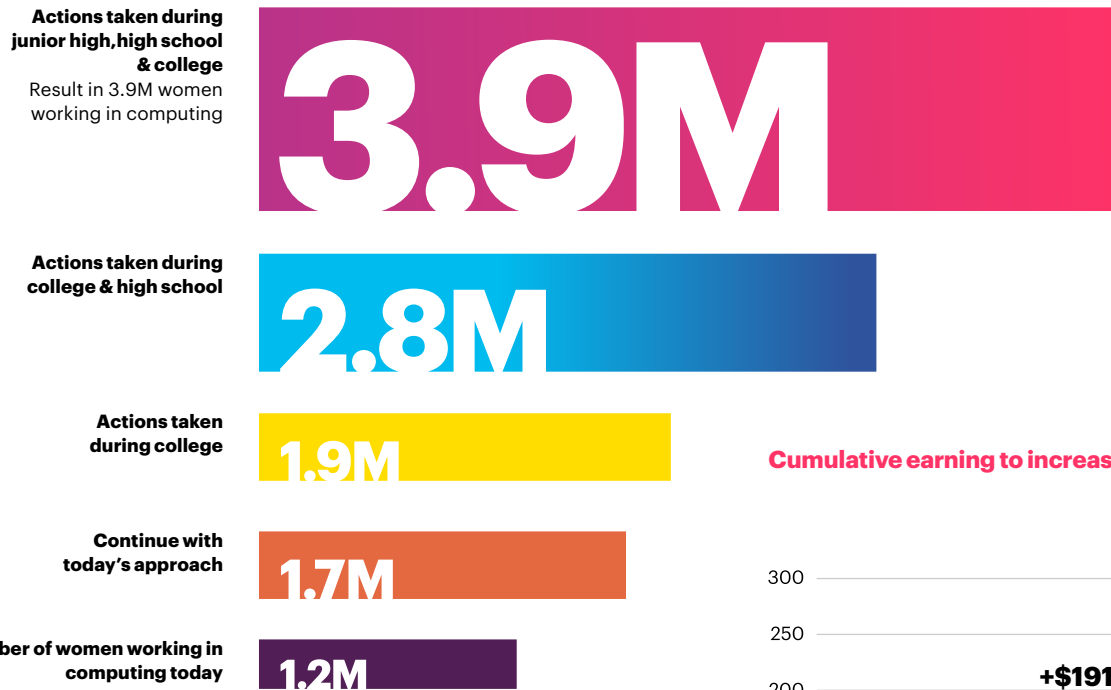

Computing is for girls **(+25%)**

Experience of computing **(+18%)**

Inspiring teacher **(+16%)**

Computing is 'cool' **(+11%)**

HIGH SCHOOL

Inspiring teachers **(+16%)**

Positive role model **(+14%)**

No friends studying computing **(-33%)**

Not enjoyable **(-31%)**

Computing not taught **(-30%)**

JUNIOR HIGH SCHOOL

COLLEGE

Figure 1: Factors influencing girls' interest in computing at each stage of their education

Where to from here?

Our analysis suggests that by implementing a strategy focused on these three stages, we would help to more than triple the number of women working in computing in the U.S. by 2025. This would expand the number of women to 3.9 million (see Figure 2) and increase the female segment of the computing workforce from 24% to 39%. Most importantly, this would significantly reduce the skills shortages of American businesses. Accenture research shows that if we act on this opportunity, we could also boost women's cumulative earnings by $299 billion over the next 10 years (see Figure 3).
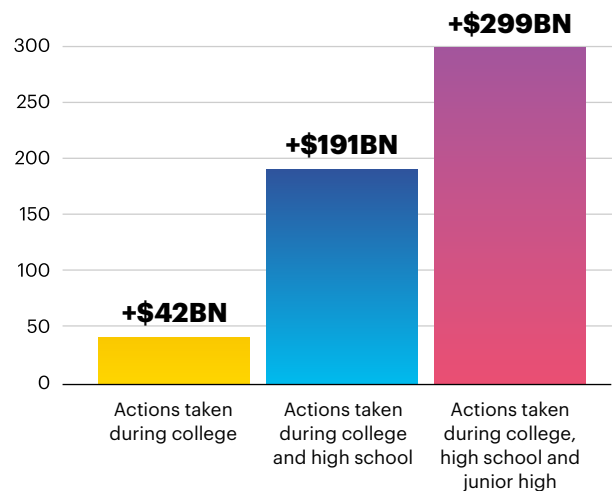
However, achieving progress on this scale will require a sustained effort, and action must start now. It will be 2020 before actions taken today start to deliver the first real signs of change by bringing more women into computing. If we continue to delay, the gender gap in computing will keep on widening, negatively impacting the U.S. economy and opportunities for women.

Women in computing could more than triple by 2025

Actions taken during junior high, high school & college
Result in 3.9M women working in computing

3.9M

Actions taken during college & high school

2.8M

Actions taken during college

1.9M

Continue with today's approach

1.7M

Number of women working in computing today

1.2M

Figure 2: Impact of taking action on the number of women working in computing in the U.S., 2016–2025

Cumulative earning to increase by $299 billion

+$42BN
+$191BN
+$299BN

	300
	250
	200
	150
	100
	50
	0

Actions taken during college — Actions taken during college and high school — Actions taken during college, high school and junior high

Figure 3: Impact of the strategy identified on women's cumulative earnings, 2016–2025

GETTING TO WORK

So, how do we begin to crack this gender code in computing? And what can we do to help girls on their journey from junior high through college and ultimately into the computing workforce?

There are several programs currently at work in schools and elsewhere seeking to drive children's interest in computing and coding, such as the government driven *Computer Science For All*. Girls Who Code is specifically building a pipeline of young women to work in computing. It has reached 10,000 girls through specially-designed after school clubs and summer immersion programs.

As the research shows, exposure alone is insufficient to increase the proportion of girls pursuing computer sciences. It is important that campaigns designed to promote participation by young people in computing include elements to specifically appeal to girls. Without such efforts, there is a danger that such initiatives will amplify the current gender imbalances given the entrenched perceptions of computing as a male pursuit.

We outline a three-stage approach, reflecting the different factors at play in each phase. By understanding this progression and applying relevant actions at each stage, in sync and in sequence, we can engage millions more girls at every stage of their journey.

Girls Who Code: Young coders respond to an environmental crisis

Maya and Lucy are middle school coders from New Jersey. When they heard about the lead poisoning water crisis in Flint, Michigan, they decided they could help. They may have been far from Michigan, but they used their new found coding skills to build a website, Get the Lead Out, to educate their fellow students about the dangers of lead poisoning and what to do about it. Their teacher persuaded them to join Girls Who Code. They learned HTML which helped them create the website. Their success stemmed from combining their love for coding with their broader interest in social and environmental affairs.

The unique contribution of Girls Who Code includes a range of creative approaches. Project-based computer science courses help students learn core concepts to address applications and issues based on their interest. Their Sisterhood initiative allows students to join a supportive and diverse squad of girls. And Girls Who Code gives participants an opportunity to meet with and learn from female engineers who can inspire the students and pass on tips for success.

JUNIOR HIGH SCHOOL
SPARK GIRLS' INTEREST

Show them how computing can be cool and fun and that it's not just for boys

Intervention must begin in junior high. This is because junior high is the point where the seeds of computing can be planted and start to germinate, and influence a girl's subsequent journey through high school and into the workforce. In fact, 74% of women working in computing were exposed to computing in junior high, compared to 49% of those who are not working in computing. Here are three actions we have identified to spark girls' interest at the junior high stage:

Action 1: Deepen girls' hands-on computing experience

Our study reveals that girls who play computer games when they are young are four times more likely to go into computing or coding roles as adults than those who don't (see Figure 4). This highlights an opportunity to generate enthusiasm in younger girls by introducing them to coding in fun ways through computer games and toys, whether at school or at home. A good way to help achieve this could be to incentivize manufacturers to develop and promote games and toys that appeal specifically to girls.

Action 2: Change girls' perceptions of computing

Overall, the image and its "boys only" associations of computing influence all stages of a girl's journey en route to a career, but they have relatively more influence on younger girls. Our study reveals that girls interested in studying computing are less likely to see the subject as just for boys or to think that boys are better at it than girls. They are also less likely to say they are 'average' at computing (as opposed to being confident in it). Similarly, they are less likely to say that they are bad at math and to think of computing as "geeky" rather than "cool."

Girls who think computing is cool will likely have an 11% greater interest in computing, and those who think computing is "for girls" will have a 25% higher interest than those who don't (see Figure 1).

Girls with early exposure to games are 4x more likely to go into computing/coding

EARLY EXPOSURE TO GAMES **39%**

NO EARLY EXPOSURE TO GAMES **10%**

Figure 4: Impact of early exposure to games on girls' likelihood to go into computing

"When we were at middle school, there was this program called Scratch for kids to learn how to code, and that was really cool."
YOUNG WORKER, NEW YORK

Greater efforts need to be made at school and at the broader national level to tackle stereotypes. More focus is required on working with the media industry to change how computing and coding are portrayed. According to *Computer Science for All*, portrayals of men as computer scientists and engineers in family films outnumber portrayals of women by 14.25 to 1.[13]

Action 3: Support parents and teachers in understanding the wider role of computing

Our research shows that the image of computing is changing for the better: 62% of junior high girls say they perceive it as "cool." And 60% of high school girls and 57% of parents and young people working in the computing industry agree. Still, there is little awareness among any group that applying computing and coding to real societal problems can help change the world, which can be a powerful hook for girls and a magnet for women. So while young girls want to make the world a better place, they don't see how a computing job would help them achieve their dreams and ambitions.

Unfortunately, young girls don't get much guidance from adults on how working in computing can enable them to realize their aspirations. Just 17% of parents and young people working in computing believe this kind of work can change the world. Even when parents want to provide positive guidance, many feel ill-prepared and under informed about opportunities to study coding at school. Some 46% of parents believe computing and coding are high priorities, but only 25% feel well informed about the benefits of studying computing/coding.

As for teachers, only 11% believe computing can change the world. Compared to parents, young workers, undergraduates and girls, teachers are least likely to see computing as cool or well paid. Worse still, 66% of computing teachers say that they would rather be teaching something else.

Taken together, these findings point to an imperative to provide parents and teachers with more help and information about the broad benefits of computing and its role driving the new digital business models that are transforming the U.S. economy. A 'Teachers Who Code' program could combine technical education with a greater appreciation for the dynamic role of computing in business strategies. Alongside the Teach for America program, greater efforts could be made to hire not just graduates to teaching but young computing professionals. More formal links between the technology and teaching professions could help improve teachers' perceptions of computing.

"My dad helps create apps, so I thought that would be fun to do."
HIGH SCHOOL GIRL, ATLANTA

Girls versus boys

Generally, our research shows that the same levers that boost girls' interest in a computing/coding major apply to boys as well. But some significant variations emerge even when they are equally exposed to computing at school. For example:

• Boys' interest in a computing major is 26% higher than girls, and boys are 19% more interested in computing/coding as a major compared to girls.

• While 40% of both boys and girls had role models in high school, boys' interest in computing/coding is 13% higher.

• While boys' level of interest in computing/coding is the same whether they have male or female teachers, girls' interest is significantly higher if they have female teachers.

IN HIGH SCHOOL
SUSTAIN GIRLS' ENGAGEMENT

Make sure that they don't fall into the "high school trap"

The high school years represent a perilous time for girls' involvement in computing. As our study shows, large numbers of girls who were engaged in the subject in junior high lose interest in high school and never come back to computing (see Figure 1). And, as Figure 5 shows, of those studying computing/ coding at some stage, 84% do so in junior high vs. only 67% in high school. This is why the priority in high school must be to keep them involved and engaged – and ensure that they avoid falling into the "high school trap" where previous gains in securing girls' interest in computing/coding are lost due to a range of new negative factors that have an impact at this next stage of their education. We have identified three actions to help expand the pipeline of high school girls going into computing:

Action 1: Redesign high school computing courses to appeal to girls

First-hand exposure to computing or coding emerges in our research as a key factor in developing and maintaining girls' interest. Efforts should be made to increase the availability of computing and coding in all high schools, in conjunction with actions aimed at providing more innovative and engaging teaching.

Where girls are exposed to computing/coding

Schools can learn from the summer camp experience. We found that 81% of high school girls who studied computing over the summer were interested in studying computing at college, compared to 52% of those who only studied computing at school.
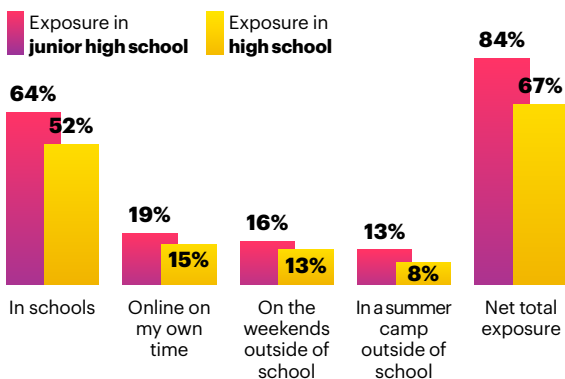

Figure 5: Girls' experience of computing at junior high school and high school

"With just two to five years' experience I could get a really good career."
HIGH SCHOOL GIRL, ATLANTA

One of the reasons for that is likely to be the all-female environment and the engaging approaches to teaching. In short, girls at summer camp find computing enjoyable as they study with their female friends. Schools that can create some of these conditions through curriculae geared to girls will likely see higher levels of engagement.

The positive impact of these changes could be amplified still by repositioning computing courses to align them with girls' interest in problem-solving and making the world a better place. This would involve placing less emphasis on theory in coursework. Right now, a far larger proportion of high school girls (33%) say that they do not enjoy computing classes compared to junior high girls (15%). So it is vital that our schools and teachers show girls that pursuing computer science is one way that they as individuals can make a real impact on the world.

Action 2: Create grassroots campaigns to motivate peer group action

Teen girls are highly impressionable, and as we have demonstrated, media images strongly affect their behavior and career choices.

What's needed is grassroots action through government- and/or industry-driven re-branding campaigns designed to dispel the myths about computing – geeky, only-for-boys and so on – and explain how people who work in computing can help improve the world.

Such initiatives might be modeled on successful campaigns such as "What an engineer looks like," Michelle Obama's "Let's Move!" or the "Play 60" campaign by the NFL. Campaigns targeted at motivating girls to go into computing should also encourage girls to be proactive in using computing to support their peers, such as developing apps that address girls' issues at school or that foster collaboration and self-support.

"Definitely [girls want] more clubs and after schools programs. We should be making a connection between ladies of distinction and computing or coding, because a lot of the girls want to feel empowered."
TEACHER, ATLANTA

Florida boosts computing in schools

In early 2016, Florida senators approved a bill enabling students in the state's high schools to take classes in computer coding in place of a foreign language. The bill was introduced by Sen. Jeremy Ring, who said: "If you don't have an understanding of technology, you will be left behind. It's a basic skill, as much as reading and writing."[14]

Delivering inspiring teaching: Arkansas schools focus on training coding teachers

Arkansas approved a new bill in 2015 requiring schools to offer computer science classes in all high schools by the fall of that year – it's the first state to pass such a law. Almost 4,000 students enrolled – a 260% increase from the previous year. The Arkansas program also trains teachers. The plan is to certify more than 1,000 coding teachers in high and junior high schools, and provide basic training to 10,000 K-8 teachers.[15]

Action 3: Attract more women teachers

According to our research, having inspiring teachers for computing/coding makes girls much more likely to go into computing – and the uplift is even greater if those inspiring teachers are female. This highlights the need to increase the number of women teachers in high school, and provide role models for girls.

Steps to attract more women teachers should be accompanied by initiatives to ensure that those people who influence, teach, and guide high school girls – especially teachers and parents – are better informed. This might include providing teachers, for their lesson plans, with real-world examples of how computing is transforming various industries, from entertainment to healthcare to hospitality. As Figure 6 shows, 73% of high school girls who had a teacher who inspired them said they were interested in studying computing, compared to only 26% of those who had a less inspiring teacher.

Teaching is likely to be more inspiring if the teaching profession and businesses collaborated to bring young technology professionals into schools as storytellers and mentors. The more high school girls can appreciate today's transformative power of digital – within every field and every industry – the more they will see its value in their own futures. Significantly, 62% of girls in high school who have had someone encourage them to study computing and coding say they are likely to major in it at college, compared to only 15% who have had no role model.

Girls who have an inspiring teacher in high school are significantly more likely to go into computing/coding

HAD LESS INSPIRING TEACHER **26%**

HAD MORE INSPIRING TEACHER **73%**
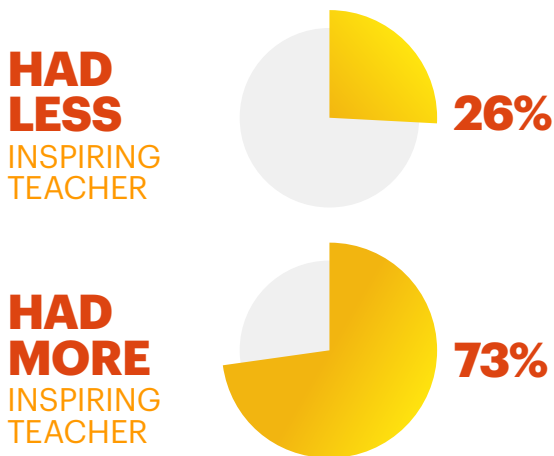
Figure 6: Impact of an inspiring coding teacher on girls' intention to go into computing

"**My calculus teacher in high school was also my engineering and design professor so he was so passionate about it, and just funny - he made the class fun. The fact that he made me enjoy the subject inspired me.**"
STUDENT, ATLANTA

IN COLLEGE
INSPIRE YOUNG WOMEN
TOWARD A CAREER IN COMPUTING

Role models, retooled courses and summer immersion programs

While the "high school trap" makes that stage critical for girls' interest in computing, the college years are equally vital – for different reasons. As our study reveals, the door to computing never closes, and college is the time when young women are open to new ideas about their careers. Well over half (58%) of those working in coding and computing who went to college did not major in computing as undergraduates. This shows that when college women realize how they can put computing skills to work in almost any career, they become more open to computing as an option. Here are three actions at the college stage to inspire women to pursue careers in computing:

ACTION 1: Give computing courses a makeover

There's clear potential to give the language and image of computing a makeover. This includes engaging young women by describing computing courses – and potential careers in the field – in ways that capture women's strong interest in problem-solving, especially around real-world and social issues.

"I was surprised by how easy (coding) was and how quickly you could pick it up."
YOUNG WORKER, NEW YORK

Colleges that have taken this step have seen a dramatic increase in female participation. For example, in its introductory computer science course, the University of California, Berkeley[16] decided to emphasize the impact and relevance of computing to the world at large, beginning each class with a discussion of a recent tech-related news article. UC Berkeley also renamed the "Introduction to Symbolic Programming" course "Beauty and the Joy of Computing." While the redesign was not strictly to attract female students, women have outnumbered men among the course attendees for the first time in 20 years.
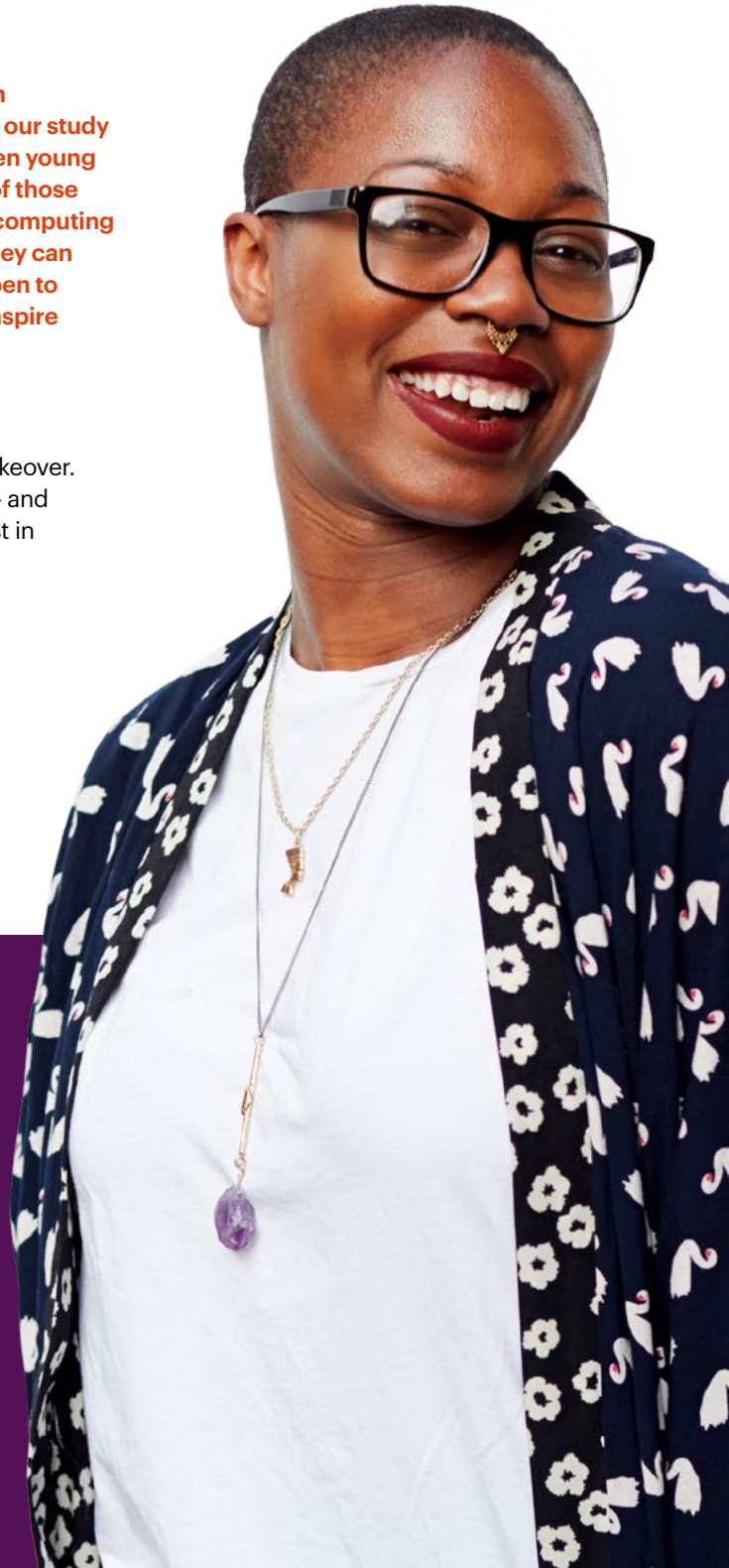
Action 2: Offer female students immersion programs

Our research shows that college women are open to convert to computing while at college. Therefore, a positive step would be to offer all undergraduates – not just computing or technology majors – on-campus and summer immersion

"There's so much freedom in it and you can code what you want, design what you want, and make it actually work."
STUDENT, ATLANTA

programs to experience computing/coding. Harvey Mudd College[17] in Claremont, California, has created various initiatives to make the computer science department more welcoming to all undergraduates, including offering summer courses. As the information panel describes, 40% of the college's computer science students are now women.

Action 3: Create female mentorship and role model programs

Female undergraduates and young workers tell us that having someone who encourages them plays a significant role in the decision to major in computing (see Figure 7). We also find that the influence of role models is strong among women who don't study computing at college but then go on to pursue a computing career.

These results point to the value of having visible role models who can "sell" computing and coding to girls at the undergraduate level. These role models can inspire college girls, whether they major in the humanities or in STEM disciplines, to take interest in joining the computing workforce, and provide them with the essential impetus and direction needed to do so.

Harvey Mudd College's female-oriented computer science courses see women's participation surge

Ten years ago, women accounted for only 10% of computer science majors at Harvey Mudd College in California. Today the college has boosted female participation dramatically by making its courses more accessible and inspiring to young women, using a three-strand approach. First, it undertook a rebranding campaign, including renaming "Introduction to programming in Java" to "Creative approaches to problem solving in science and engineering using Python." Second, after the introductory class, female faculty members started taking the students to the annual Grace Hopper Conference that celebrates women in technology. Third, it offered a research summer course between the freshman and sophomore years. Within four years, these changes saw the proportion of women enrolling in Harvey Mudd's computing courses leap to 40%.[18]

"When I switched my major I decided my focus would be game design because my sole focus is interaction. It's fun combining interaction with the body with something that can react on the screen."
YOUNG WORKER, NEW YORK

Girls who are encouraged by a role model are more likely to major in computing/coding

HAD SOMEONE
WHO ENCOURAGED THEM

62%

DID NOT HAVE SOMEONE
WHO ENCOURAGED THEM

15%
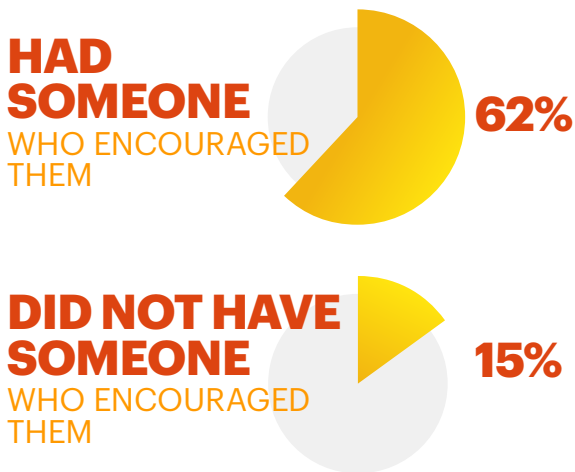
Figure 7: Influence of role models on girls' decisions to major in computing

In this report, we have included several examples of female computing role models who could inspire college girls in this way.

The scale of women's current and potential contribution to computing is further demonstrated by Accenture research that found that female members of corporate boards are nearly twice as likely as their male counterparts to have professional technology experience.

"I saw the opportunity, it's a growing field and I saw the money. Coming out of school I definitely wanted a job that could pay off student loans and where I could grow."
YOUNG WORKER, ATLANTA

According to Accenture's 2016 *Women on Boards Study*,[19] 26% of female board members in the U.S. have tech experience, versus 17% of men. Clearly, women with computing and technology experience seem to have an advantage at all levels of business. The data also suggests that there is fertile ground on which to develop mentor and role model programs.

Teresa Deveaux, Director at Microsoft

Teresa Deveaux, Director on Microsoft's Management Excellence Strategy team, joined Microsoft 17 years ago as manager of a Product Support team. "I didn't have any computer science education," she remembers. But she did have a call center background. "I couldn't have answered a technical call, but I had the right background to help support the call center." Her career in computing took off from there.[20]

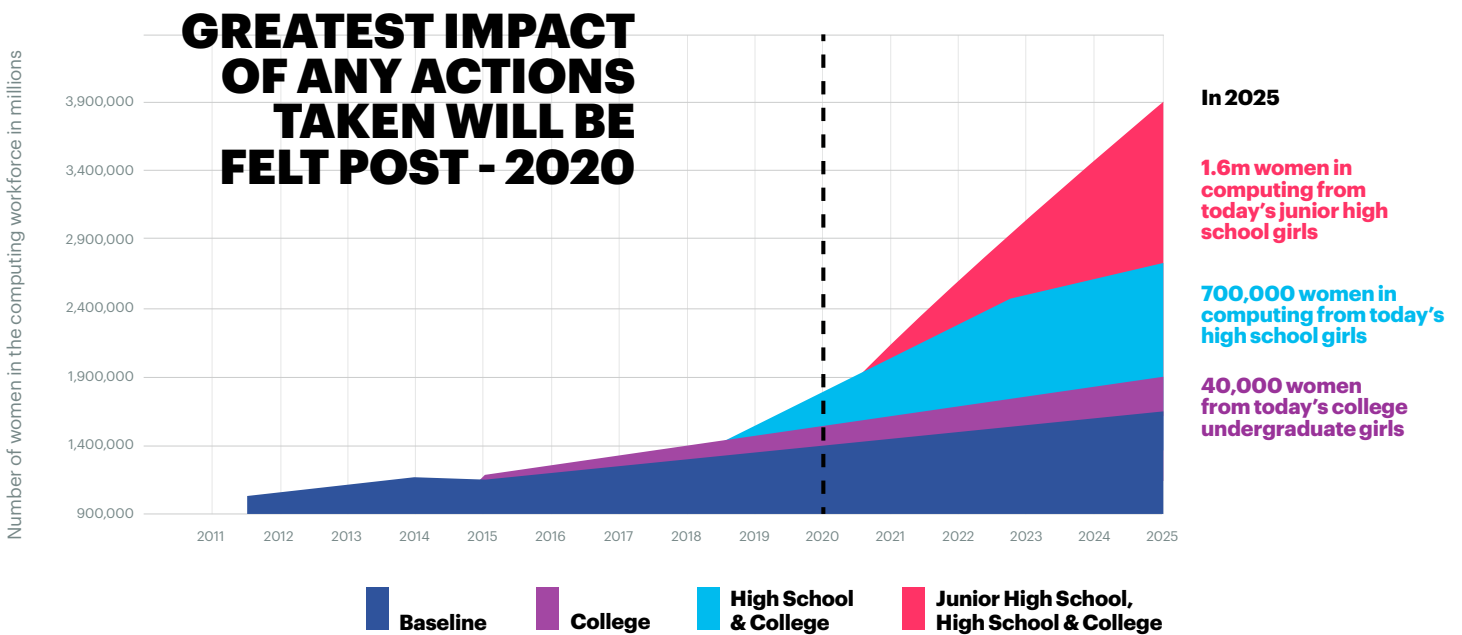**Lynn Root, Software Engineer, Spotify**

While working as a banking analyst, Lynn Root originally planned to get a masters in financial engineering. But in order to enroll she had to know how to program in the computing language, "C." She took an online class, fell in love with programming – and the rest is history. She taught herself how to program and landed her first job at Red Hat in 2012. Then she joined Spotify, where she has had a number of roles. Lynn is the founder of PyLadies San Francisco, a mentorship group for women and friends in the Python software community.[21]

ACT NOW

Seeking to improve the pipeline of talent, Accenture and Girls Who Code have used the findings from our study to pinpoint precise actions at each stage of a girl's educational journey. The sooner these actions are taken – and the earlier in a girl's education – the bigger the uplift in getting girls and young women into computing. The figures speak for themselves: more than two-thirds (69%) of the next decade's potential growth in the number of female computing workers will come from starting our work with younger girls, especially in junior high.

As Figure 8 illustrates, girls currently in junior high have the potential to fill 1.6 million computing positions by 2025. In contrast, girls currently in high school have the potential to fill 700,000 computing positions by that year. And the potential to expand the pipeline with undergraduate girls – while clearly worth pursuing – amounts to just 40,000 positions by 2025, although these would clearly hit the job market faster than the other two groups.

GREATEST IMPACT OF ANY ACTIONS TAKEN WILL BE FELT POST - 2020

Number of women in the computing workforce in millions

In 2025

1.6m women in computing from today's junior high school girls

700,000 women in computing from today's high school girls

40,000 women from today's college undergraduate girls

■ **Baseline**   ■ **College**   ■ **High School & College**   ■ **Junior High School, High School & College**

Figure 8: The impact of actions taken with girls at different stages during their education

WHO WILL CRACK THE CODE?

We have shown that there is an opportunity to deliver dramatic increases in female participation in computing across the U.S., thereby providing huge and lasting benefits for the whole of society and the U.S. economy.

But who will crack the gender code to enable this? It needs to be all of us. Girls and young women. Schools. Businesses. Government. Not-for-profits. This work demands collaboration around a shared agenda.

America needs more girls and young women in computing. It's time to make it happen. ***Together.***

METHODOLOGY

Accenture Research measured the pipeline of the female computing workforce by assessing the relative effectiveness of actions that impact girls' interest in computing. We took four steps:

1. We collected a range of published data on U.S. population, education and the nature of the computing workforce.

2. We undertook in-depth qualitative research with more than 150 individuals in two contrasting communities – New York and Atlanta. We explored the topic of computing with girls aged 12–16, with their parents and friends. We observed high school debates on computing and conducted focus groups with teachers, principals and young workers.

3. We ran five surveys in June and July 2016 that were representative of the U.S. population. These included interviewing 4,000 girls in junior high and high school, 500 boys aged 12–18, 650 male and female college students, 2,000 working women under the age of 30 (including 500 working in computing), 250 teachers and principals and 2,200 parents of girls aged 12–18.

4. Using the above data sources, we created a model to identify the factors that most influence girls' decisions to pursue computing further at each stage of their educational journey. The model was then able to demonstrate the impact on the number of women working in computing of acting on the most positively influential factors. The model was then used to calculate the potential uplift in pay that comes from computing and therefore estimate the impact on women's earnings in the U.S.

Footnotes

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3. http://www.npr.org/sections/money/2014/10/21/357629765/when-women-stopped-coding
4. http://www.bls.gov/cps/tables.htm Source: Accenture Research calculations based on BLS - Labor Force Statistics from the Current Population Survey; Table 11 - 2011 to 2015 saw 4.6% growth in computing jobs v 1.5% growth in other jobs
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About Girls Who Code

Girls Who Code is a national non-profit working to close the gender gap in technology. Through its Summer Immersion Program and Girls Who Code Clubs, the organization is leading the movement to inspire, educate, and equip young women with the computing skills to pursue 21st century opportunities. Additional information is available at www.girlswhocode.com.