Episode 3 — Myth: It's Not Us, It's the Pipeline

Overview:
There is a common belief that women are underrepresented in fields dominated by men, such as in science, technology, engineering and math (STEM) sectors, because there are just not enough women in the pipeline. Some have argued that women choose not to enter these careers because they simply have different preferences or aspirations. In turn, this implies that companies and firms do not have responsibility for a lack of gender diversity. However, this is a myth. A substantial number of women are qualified to work in fields dominated by men. For instance, in 2015 in Canada, women accounted for 43% of university graduates from STEM programs. Yet, women with STEM degrees are less likely than men with the same degrees to work in science and technology occupations. We bust this myth with leading experts to show that companies and firms need to take more action to make STEM fields more equitable and less gender segregated.

Featured Guests:
Dr. Sharla Alegria, *University of Toronto*
Dr. Jackie Bouvier Copeland, *Former COO of AnitaB.org*

Research Mentioned:

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7. West, S.M., Whittaker, M. and Crawford, K. (2019). Discriminating Systems: Gender, Race and Power in AI. AI Now Institute. https://ainowinstitute.org/ discriminatingsystems.html

Additional Sources:
https://www.gendereconomy.org/women-in-stem/

Transcript
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Dr. Sharla Alegria: There's basically no difference between girls and boys on practically every standardized test and women actually get higher grades in math class, like on average in their math classes. So lots of women are good at math and lots of women enjoy it. So I'd really love it we threw that one in the rubbish.

Alyson: That was Dr. Sharla Alegria. Welcome to Busted the podcast where we bust prominent myths related to gender and the economy. By teaming up with leading experts, we uncover the origins of each myth, find out what the research actually says and give you the tools to bust each myth yourself. I'm Alyson Colón and my pronouns are she and her.

Carmina: and I am Carmina Ravanera and my pronouns are she and her.

Alyson: and the myth we're busting today is the lack of women in the STEM field is due to a pipeline problem. Carmina, let's start with the problem at hand. What does the data say about women's representation in STEM?

Carmina: So just so everyone is on the same page STEM refers to the fields of science, technology, engineering, and mathematics. And while we shouldn't characterize these fields as if they're all the same, they are in general dominated by men, particularly in the fields of technology and engineering. So, I'd like to bring up some statistics that I think will help everyone understand the current context of women in STEM. First, data gathered by project include in 2018, indicates that men still outnumber women in the majority of tech companies, especially in leadership and management roles, by as much as 70%.

Alyson: Oh, that's a lot.

Carmina: Yeah. And the UNESCO 2018 report found that the percentage of STEM researchers, professionals engaged in the conception or creation of new knowledge, who identified as women was only 29% globally and 33% in North America and Western Europe. And finally, if we zoom in on AI or artificial intelligence, the technology that's changing everything, the numbers are even worse. A 2018 report by the AI now Institute found that only 15% of AI research staff at Facebook and just 10% in Google are women.

Alyson: Wow. Those are some really stark numbers. So clearly there is a representation issue.
So the myth that we're looking at is that there's a lack of representation because women and other diverse groups, just aren't in the pipeline. What exactly does the pipeline mean? Can you say more about it?

Carmina: Yeah. The pipeline refers to a preschool to higher education to job path. And it's based on this idea that if enough women start in the STEM pipeline, then they will enter and stay in the STEM workforce. Elizabeth Garby, a writer with Slate magazine, has described it in this way: she said, "imagine if you will, a toddler at the top of a tube slide that begins with early education and ends with a STEM degree, eventually becoming the chair of a university physics department or a researcher at a national lab."

Alyson: Right. It can be easy to think that people's careers just occur in a straight line, but it usually doesn't happen this way. There are lots of different paths that can be taken.

Carmina: Yes. But unfortunately, thanks to this pipeline idea, many organizations and companies argue that the reason there is a lack of diversity in the STEM workforce, especially in these fields like engineering and machine learning, is just because there simply aren't enough properly skilled members of underrepresented groups for hire. But what critics argue is that this concept of the pipeline actually conceals the real issues that are preventing women and other underrepresented groups from not only receiving degrees in STEM, but also from entering and staying in the STEM workforce.

Alyson: So tell me more about these critiques. What are researchers saying about the problems with the pipeline metaphor?

Carmina: Well, to learn more about this, I first talked to Dr. Sharla Alegria. Sharla is an assistant professor of sociology here at the University of Toronto. Her research interests are on the persistence of inequalities and the equity-related consequences of flexible work practices. She's also done some really interesting research on race and gender in tech work. In our conversations, Sharla started by suggesting that the leaky pipeline metaphor is not really an accurate or helpful way of understanding how women and other marginalized groups enter and exit careers. Here's what she had to say.

Sharla: And I do agree that it does suggest, one pathway. But of course we know that's not the case. People start careers in different places, and they decide they want to change. They go back to school, they get more education, more training. They get on-the-job training and [inaudible]. This would have to shift what they do. There are lots of different entry points and exit points. And of course, you know, not everyone starts in the same place or under the same conditions. So, when we think of a leak, like a leaky pipeline, where some people are more likely to leak out it's easy to lose sight of all the things that might make different pathways look like a better choice, or that might cause people to want to exit. You know, maybe they experienced discrimination or limited resources or they discovered something else they really love. I've heard an alternative metaphor proposed by Anna Branch. She's vice-chancellor at Rutgers University. So just thinking of a highway instead with any number of on-ramps and off-ramps like potholes traffic jams potential for flat tires, right? Any number of other obstacles that might affect some drivers more than others. Personally, though, I like to avoid anything that makes it seem like it's an individual person's choice to leave, or that there’s a failure on their part.

Carmina: As Sharla says in a lot of cases it's not truly an individual's decision to leave a career or a field and there are so many possible barriers.

Alyson: And what are some of the barriers?

Carmina: The research shows that there are several factors that push women out of the existing pipeline and even out of the STEM workforce altogether. I spoke about these with Dr. Jackie Bouvier Copeland, who is the former chief operating officer of Anita b.org, formerly known as the Anita Borg Institute for women and technology. She is now the founder and CEO of the Women Invested to Save Earth fund, otherwise known as the WISE fund. Jackie is a trained anthropologist and an urban designer. She's

worked as a social impact executive for companies, foundations, non-profits, and governments around the world. Here's Jackie talking about some of these problems in the tech sector.

Jackie: One of the key issues that we see and I'm going to start from a worldwide level, and this is really true that in almost every country we've encountered at some level there is the implicit bias that women are better in some professions than others, and are not naturally inclined to be successful in technology degrees or careers even. And so, within five ten years, depending on the country of a woman, career cycle in technology, that assumption by managers is often a barrier and creates a glass ceiling and uneven expectations and needs. It's more of a cultural factor that can result in expecting women to be twice as good to get half as much, particularly since there are still severe pay gap for technical men and women performing the same job in technology companies. Across the board in the US and other countries, there is still pregnancy discrimination for women of a certain age, the old school discriminatory attitudes that one can't be a professional and a mother simultaneously. And then there are, of course, the horrendous practices that we read about in the press about rampant sexual harassment that continues to exist in the tech and other sectors and all of the institutional and cultural barriers combine to have a really severe impact on technical levels and upward mobility. It's interesting that most of the research shows that at the entry level men and women are pretty even in terms of, opportunity, treatment, and pay. But ironically as a woman moves up the ladder culture to that 5-to-10-year period, she will typically run into some combination of the barriers that I just listed. And all over the world, it is driving women out of the tech industry.

Alyson: This makes me think of a study that was looking at women, engineers and burnout. The study was utilizing the concept of social identity threat, which happens when individuals feel devalued based on their belonging to a social group. So this study found that women engineers were regularly having negative conversations with men engineers in their workplace.
And these interactions were making them feel incompetent or not accepted. And as a result, these women were experiencing exhaustion and burnout. But the researchers didn't find the same result for men when they had negative conversations with women, nor did they find the same result between men or between women. So it's an interesting finding and it demonstrates the importance of workplace culture on addressing the gender gap.

Carmina: That's a great example and workplace culture can really make or break how diverse a sector is. There's also a recent study that shows that women studying engineering in college were socialized to feel that they were in a bad fit for the profession. They felt excluded in group work and internships because they kept being told to do menial or administrative tasks and they were stereotyped, and they experienced sexual harassment. And meanwhile men students felt that their internships and their group work cemented their self-confidence and their skills.

Alyson: Wow. Well, there's clearly a lot of bias and discrimination against women occurring in these sectors, but let's go back even earlier than college. Let's look at childhood. A lot of people still think that girls aren't as good at math or other technical skills as boys and this supports the myth of the pipeline problem because it suggests a reason for why girls and women don't enter STEM.

Carmina: Sharla debunked this idea when she talked to me about how it's not women's and girls' skills that keep them out of STEM. Like Jackie, she talked about structural barriers to certain STEM fields, physical science and engineering in particular.

Sharla: There's basically no difference between girls and boys on practically every standardized math test. And women actually get higher grades in math classes, like on average in their math classes. So, this isn't enough to get into that. It really isn't about math because women hold more than 40% of the degrees in math and statistics in a bachelor's and a master's degree level. So, lots of women are good at math and lots of women enjoy it. So, I 'd really love it If we could just toss that one to a rubbish heap. There are some real things that are like, math is not it, like, that's just not the issue but there are some real things in certain fields, engineering and physical science especially, women deal with these questions about their competence, exclusions- from things like study groups that actually help you get good grades, and persistently feeling like you're part of the culture, part of the community. Overall, there's a culture that suggests that they just don't belong. Sociologist Cecilia Ridgeway describes these as fields with a masculine cultural frame. I think it's kind of useful. So, here's the other piece. Lots of people like their identities to be consistent. So, if you think about yourself as a woman then it feels comfortable and consistent to do things that seem consistent with that. You might find fields where there are more women, or that fields that don't feel as masculine, more comfortable. But of course, not everyone feels that way. And some people enjoy disrupting those kinds of expectations. And for those folks, there are still lots of other subtle and sometimes not so subtle messages that they don't belong.

Carmina: So Sharla and Jackie both confirmed that it's not innate differences that keep women out of certain career paths, but the exclusion, culture and socialization that often signals to them that they just don't belong there.

Alyson: Well, that makes sense. I mean, who would want to work in a field if they felt like they could never fit in? And research also tells us that the situation for women of color in STEM is particularly bad. Did Sharla and Jackie provide any insight into the specific barriers that women of color face?

Carmina: Yes, they did. Here's what Jackie had to say about this issue.

Jackie: Woman of color had the additional burden of dealing with racial discrimination and all of the expressions of it that combine in really complex ways with patriarchy and sexism, creating a real, double bind. For women of color that is reflected in all of the equity statistics, so representation and pay and retention and funding are all on par for women in general. But in looking at women of color, specifically, the numbers are much more dire. There is also the assumption of inferiority relative to people of European descent, or what we call white or Caucasian in the US context based on skin color. The racial dynamic also can refer to national origin, so being discriminated against based on your perceived immigrant status. There are even studies that demonstrate that people who seem to have different sounding or immigrant names, surnames, or first names have a hard time even making it through the front door. And so, our biases around gender and race , and ethnic identity, all collude in the case of women of color, attempting to get in their way in their tech career journey.

Carmina: And Sharla had a great example of racial bias occurring in computer science and tech fields. She spoke about her research on how women of color deal with isolation and limited career advancement.

Sharla: And in my research, I interview women and men tech workers. And the black women I interviewed in computer science, I heard lots of stories of isolation, limited career advancement, and having, like, just

feeling like "I had to work twice as hard to be seen as half as competent". So one of the big things I saw in my research was that white women in tech tend to be pushed into sort of these like interpersonal managerial tracks. So, there are often two kinds of different management tracks in a lot of tech companies, where there's a technical track for senior engineers. And that, that track often leads up to the executive level of the company. Or at least it can. Not for everybody, but there's opportunity there. Then there's more of an interpersonal managerial track. It doesn't really seem like it goes up as high as we're used to. When I talked to women I couldn't identify anybody that had reached the top of their company by starting in a tech position and moving into one of these more hybrid interpersonal technical positions and then move up from there. But a lot of the white women that I interviewed tended to be kind of pushed by their managers by the supervisors, into these sorts of managerial, these interpersonal managerial positions. And they would think about that as related to, you know, like "I had these skills for leadership." and "I had these skills and doing work with people". Women of color struggle to be seen at all. [In my research] they were overlooked; if they wanted a new role, if they wanted to move into a different position, if they wanted more authority, if they wanted to have more of an influence on the design of a product and what not. They really needed to, in most cases, leave the company and find a new position in a new company where they could achieve those goals more effectively. So, I think the moral, the summary of all this is that women of color face all the same racism and all the same sexism, but it amounts to a kind of exclusion and invisibility that white women experience some amount of too. But it was just so much harder for them [WOC] to be seen as competent in their technical roles.

Alyson: Women of color face multiple and intersecting barriers. Let's talk a bit about why it's so important that we increase gender and racial diversity in STEM.

Carmina: Well, it's important for so many reasons. The first is that scientific research and advanced technologies would be more accurate and fairer if these fields were more diverse. A great example of this is facial recognition technology, which currently does a really poor job of recognizing the faces of people of certain ethnicities, such as black women. And second is that scientific research and conversations really need a range of perspectives to be effective. For example, debates around the ethical and social impact of artificial intelligence would be richer if they had more of these unique perspectives. And as well there's actually a labor shortage in STEM, specifically in computer science and data science. So, companies do need a larger talent pool and they need to retain the talent they already have. And finally, it's important to remember that these occupations tend to pay higher wages on average. So, involving more women in STEM careers could actually help close the gender wage gap and the retirement gap. And Sharla had a really good answer about why representation in STEM matters.

Sharla: I mean we care about equity and access to good jobs, right? By and large STEM jobs are good jobs. Sometimes they're also the kind of jobs that, at least like in theory, I like to think that they should be attainable to anybody who, you know, tries hard in school, learns something exciting in science class, looks up into the stars, or into the engine of a car, who goes to the aquarium or wherever, and finds something wonderful and wants to learn about it. Right? These are jobs that should be pathways for mobility. And if we think about public education as a social equalizer where merit matters, then I'd like to think that STEM jobs should be one of the rewards for investing in education, regardless of where you start out. So the fact that we don't see historically disadvantaged groups accessing STEM jobs at the same rates as other folks, tells me that something is broken, right? That meritocracy isn’t working. And if we care about equities then we need to understand why.

Alyson: So, what can STEM companies do to increase the number of women in their workforce?

Carmina: Both Jackie and Sharla had some great advice for these companies. I'll let them answer this question.

Jackie: I increasingly think, and we all know the adage, that leadership starts at the top. And I think that the most effective initiatives to promote diversity, equity, inclusion, and belonging, come from the CEO's office, where it is made an absolute mandate. That the culture will be changed to be fully representative of the market. It makes business sense to be inclusive of one's full market in one's workforce. It can develop better products to have more authenticity and knowledge of those constituencies as well. I think also that part of that leadership needs to recognize that companies are not islands, so that they are reflective of society. And we know, in our country, just focusing on the US that we have a range of social challenges and conflicts. And if we are hiring from the general population, no matter how technically talented we are, we are all products of our society. And so we need kind of an inside and outside game, companies can create internal initiatives to promote diversity, equity, inclusion, and belonging, but increasingly the top levels of leaders I think also need to be involved in public awareness and policy reform that removes the barriers to diverse inclusion that gives women and actually all of humanity in the tech field equal opportunity and access.

Sharla: Obviously, they could hire more. That'd be cool. But it's not enough, right? I know hiring a few, especially women of color to entry level positions isn't going to change decades of structural and cultural exclusion. I mean, they can do things like thinking creatively about the skills people actually need for the jobs and the skills that they can learn on the job. And also looking into adjacent disciplines where people have a lot of the skills that they need and care about, but maybe they're not called computer science. But they have some of those same skills. Really make people think creatively about who they're looking at hiring. We need to put real efforts into hiring from universities that do the best at providing opportunities for historically marginalized populations. The places where tuition is lower and it's easier to get in but they're still doing a fantastic job of educating the largest populations. And they can work with community training programs to find the folks with, you know, maybe non-traditional credentials, who can and want to learn and they don't have maybe the same pathway into the into the jobs. Right. So I do think that the HR recruiting folks can do a better job of looking at these kinds of alternative credentialing places. Also hire minority workers into positions with real authority. You know, there was this study, this is a few years old now, based on the US, but a handful of years ago, there were more men named John than women managing the largest companies in the US.Like, hiring people into positions of authority matters.

Alyson: So let's say someone was to say to me, Hey, Alyson, the reason there aren't more women in STEM is because there's simply a pipeline problem. What should I say to convince them otherwise?

Carmina: Here's what Sharla suggested you start with in reference to women getting STEM degrees.

Sharla: I hope that they'll start by asking folks what they mean by STEM. Actually, in the US the majority of STEM graduates are women, and in Canada the definition is a little bit different, so Canada doesn't count social sciences as STEM like the US does. Women are actually about 43% of STEM graduates. So, if we're talking about STEM, generally, women are really not that underrepresented. They're not underrepresented in the US and they're only very slightly under represented in Canada. So, maybe start there, right? This is a question of what you mean by STEM. I hope that they'll take a minute to ask, to

really consider, what are the differences across these different fields that make conditions better for women in some areas than others? Especially when we're talking about fields that are similar in some important substantive ways.

Carmina: And then you can talk about what the research tells us. That women who receive STEM degrees either aren't entering the STEM workforce or they're leaving before they can't make it up the career ladder. And this is due to several systemic barriers, including implicit bias against women's technical capabilities, sexual harassment, work family balance issues, toxic work cultures, gendered recruiting practices and other types of barriers. So basically, this problem is a lot more complicated than simply the pipeline.

Alyson: And as an individual what can I do to help advance women in STEM?

Carmina: Well, if you're someone who works at a STEM company, particularly someone who's in a management or a leadership position, you can do a lot to diversify your workforce and also to ensure that women stay in STEM.

Jackie: If you are just looking at the same networks you've been hiring from and expecting different results, nothing will change. There are millions of women who leave for a variety of reasons. We were just talking about that. The tech work force. Even sometimes when they want to stay, but the social and cultural supports are not there. I think that those women who have left are a huge potential engine for the pipeline. So increasingly US companies are starting to use returnship programs to reach out to those women who have left the field, um, perhaps to raise children or for other opportunities and, really welcome them back to the tech sector. So I say I think looking at returning is a really important opportunity. I also think it's one of the trends that will help companies reach women in different pathways. We see an uptick in formalized apprenticeship programs, which have definitely benefited men, trying to find their way into the technology field. Even so, if it's an apprenticeship that takes people working in other professions within tech companies and provide them with professional training and then move them up the technical job ladder through a combination of internal company training combined with, um, tuition reimbursement to assist with attaining a technical degree. And so, I do think that those alternative approaches of reaching out more to community-based institutions. And those can be community colleges, or it could be for your ethnic or other universities, but they can also be bootcamps or even, let’s face it, some of the male icons in tech that have driven the information age didn't even have college degrees, they were college dropouts. So, it would be great to sort of expand the network for women and people of color to also include those very highly talented. But untapped individuals who don't have the social networks to make their way into tech or create, or get VC funding to create, or internships and apprenticeships and other opportunities. And in fact, at Anitab.org, we think less in terms of a pipeline stage and more in terms of pathways that put the onus on companies to expand the networks where they're actually looking for talent. And once you do that, you realize there really isn't a pipeline problem. There is a vision problem and an access problem.

Sharla: So, Shelley Correll is the director of the Clayman Institute for Gender Research at Stanford and she said something that really stuck with me about this. You know, in lots of tech companies, especially, but not just tech companies, folks care, right? They make claims about being invested in diversity and caring about equity and I believe it. I think that they're really sincere about this but they don't treat those goals, this problem necessarily with the same kind of investment that they might treat a technical

problem. Right. So, you know, they'll set big goals to create new technologies or solve problems or what have you. And they make plans with benchmarks and timetables, and they invest resources into them. But, this is a big problem too. It's been around for a long time. Solving it takes the same kind of investment and planning and resources and time with clear goals and meaningful accountability. They might invest into other kinds of problems. So I would love to see the same kind of planning and resource investment, and the attention to the time and energy that it takes to make big structural change invested into this problem.

Carmina: And if you're not in a leadership position, or if you don't work in STEM, you can still support women in STEM by being an ally and financially supporting initiatives that are promoting gender and racial equity in the field.

Alyson: For those looking to learn more, you can look into the work of the Anita b.org as well as our work here at the Institute for Gender and the Economy on gendereconomy.org. We have an explainer on women in STEM on our website. If you go to the front page, you'll see a section called "what we're talking about". There's a link to the explainer on this topic, which will lead you to some research, briefs, articles, and videos. I encourage everyone to check it out. The research we mentioned this episode can also be found in our show notes.

Carmina: And finally, don't miss our next episode of Busted. We'll be busting the myth that women are more risk averse than men. And guess what? They aren't. Here's what Dr. Julie Nelson had to say about it.

Dr. Julie Nelson: So these articles that have these titles, "women are more risk averse than men", what they're doing and what I found overwhelmingly, was that researchers were letting their own confirmation bias, their own beliefs, influence what they said they found and how they titled their articles. When I actually got the data and did all of this, I found that if you have lots and lots of data, you know, if you've interviewed or done an experiment on lots and lots of men and women, you can find a very small difference on average and this very small difference on average means nothing really for individual men and women.

Alyson: Until next time, happy mythbusting.

Sarah: I'm Sarah Kaplan and I'm the director of the Institute for Gender and the Economy. If you like this podcast, make sure to review it and subscribe, it's how we get the word out. If you're interested in learning more about how to analyze the gendered assumptions built into your work, check out our five course specialization on Coursera called "Gender Analytics: Gender Equity Through Inclusive Design", head to Genderanalytics.org for more information.