



**GIRLS' NATURAL ADVANTAGE:
COLLABORATIVE PROBLEM-SOLVING AND
THE FUTURE OF WORK Marisa Porges, PhD**

My entire school was invited

to our local neighborhood theater to watch *Hidden Figures*, the award-winning film about three African American female mathematicians at NASA who helped put astronauts in space. In one of the most pivotal scenes, Katherine Johnson is finally allowed to join a critical planning meeting for the Space Task Group. By the end of the scene, we see her become the driving force for the team's creation of a new equation to help guide the astronauts' capsule back to land during reentry from outer space.

I wasn't surprised that both our students and the teachers were enamored with the movie's depiction of Johnson's strength and resilience. For the next week, I'd catch girls chattering in the halls about what they would've done in the same situation as Johnson and her colleagues—and whether they wanted to be a mathematician or an astronaut.

While that scene reinforces the movie's story of perseverance, hard work, and sheer gumption, it also reveals the unique perspective that these women brought to NASA's effort to put a man on the moon. Their approach to collaboration, while largely shunned because of their gender and race, was ultimately essential to fulfilling President Kennedy's vision and solving one of the most dynamic and complicated problems of the century.



As author Margot Lee Shetterly noted, in her book of the same title that provided the basis for the popular movie, there were so “many ways to screw the pooch, and just one staggeringly complex, scrupulously modeled, endlessly rehearsed, indefatigably tested way to succeed.” One of the biggest hurdles for America’s race to the moon wasn’t necessarily the technical complexity of the task or a budget that required \$20 billion and 400,000 people. Instead, it was the massive amounts of coordination and teamwork, communication and conflict resolution, adaptability and flexibility, and new leadership models required to get the job done—all features of effective collaborative problem-solving. As Shetterly described it, the scientists, engineers, and mathematicians of the Space Task Group, including Katherine Johnson, had to “turn their desks into a trigonometric war room, poring over equations scrawling ideas on blackboards, evaluating their work, erasing it, starting over.” There was no way to find new solutions to intractable technical problems without developing new systems for collaborative problem-solving, too.

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Fast-forward fifty years and you'll see that today's NASA has placed these twenty-first-century skills front and center in the training programs for its astronaut corps, engineers, and scientists. Jessica Meir, one of the eight members of NASA Astronaut Group 21, described this as balancing subject-specific expertise with the soft skills that prepare astronauts to tackle the complex challenges they regularly face in space. In a message sent from the International Space Station shortly after she completed the first all-female space walk in history, Meir explained the importance of what she called "creative problem solving," saying, "Here in space, we use all kinds of skills to get our work done. Math and science, of course, but also communication and teamwork—keys to making sure we stay safe and accomplish important tasks. Each day, we are working with the astronauts, cosmonauts, and ground teams from our partner agencies all across the globe on an incredible diversity of experiments and activities." In short, the ability to solve problems in teams is essential, in space and in life."

This emphasis even applies to how NASA now frames its education and outreach to schools, teachers, and students. In 2017, the space administration launched a new program to connect schoolchildren with the International Space Station through tailored lessons for different age groups. One of the first modules, called "Expeditionary Skills for Life," showed parents and teachers how to help children learn that when it comes to solving problems, in outer space or on planet Earth, maximizing the input you get from multiple viewpoints creates a big advantage. Collaboration is key.

In other words, the focus has shifted. Today and moving forward, one of the most important lessons we can give our kids is teaching them how to collaboratively problem-solve from an early age.

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By now, I hope you're convinced that the ability to solve problems effectively by working with two or more people to pool knowledge and find creative solutions is important—and will become even more essential to success, in and out of the workforce, over the decades ahead.

But what's the deal with the gendered aspect of this critical twenty-first-century skill? Does problem-solving in groups really look different for women and men, or for girls and boys?

Yes, it does. In fact, it's often where girls show natural aptitude and where boys need more help and training to be effective. Indeed, even while schools have yet to really emphasize teaching this skill, girls around the world are already showing that they're naturally predisposed to be better at it.

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A recent investigation by the Organisation for Economic Cooperation and Development (OECD) surveyed 125,000 students in fifty-two countries worldwide. The study was focused on measuring how effectively fifteen-year-olds solve problems when they are working with others. In particular, the team of researchers around the world looked at how students tackled problems when the solutions required “maintaining an awareness of group dynamics, ensuring team members acted in accordance with their agreed-upon roles, resolving disagreements, and monitoring progress towards a solution.”

The results were in many ways surprising—surprisingly clear, that is. And completely in the girls’ favor. When it came to collaborative problem-solving, girls performed significantly better than boys in every country, regardless of economic status or when normalizing for prior schooling in science, reading and math. On average, they scored nearly 30 points higher and were 1.6 times more likely than boys to be rated “top performers” at this essential twenty-first-century skill. This result was seen everywhere from Australia and New Zealand to Finland and Sweden, where girls scored over 40 points higher than boys in this area, to the United States and the United Kingdom, where the gender gap was closer to 30 points. What’s more, the study showed that the relative size of the gender gap is even larger than for reading, which has traditionally been considered the area where girls out-perform boys in almost every education system.

In other words, there is something about the approach girls take to communication, relationship building, and teamwork that makes them considerably more effective at collaborating to creatively find solutions when presented with problems. And this happens in spite of the fact that most schools aren’t actively teaching these skills in their curriculum.

These findings also presented a stark contrast to an earlier study that focused on children's individual problem-solving skills. During that assessment effort, OECD researchers likewise identified a gender-based difference in skills—but it under-scored that boys in general outperformed girls when it came to tackling problems alone.

Again, good news for our girls. Given changes under way in organizations and workforces around the world, which have responded to globalization and ever more complicated problems by becoming more team-oriented, the study suggests that young women are naturally “better equipped for the workplace and are more able to cope with modern ways of working.”

Our girls have the advantage at a skill that will become ever more important moving forward. This is why collaboration is an ideal talent to promote when girls are young—so they recognize the importance of this skill and can effectively tap into it as adults, ensuring it becomes their lasting advantage no matter where they find themselves.

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While we can't say with certainty what the workplace and world of tomorrow will look like or how the ever-changing job market will unfold, a close look at trends already underway can give us a glimpse into the decades ahead. And when the study of future trends is paired with an understanding of girls' social, emotional, and intellectual development, we discover guideposts for what lessons today's school-aged kids need most and how to tailor what we do—and how we do it—with girls in mind.

Consider, for example, the effect of rapid technological change and how that influences the types of jobs and skills our children will need as adults. Technological innovation, especially artificial intelligence and the influence of big-data analytics, has rapidly accelerated the pace of transformation in the twenty-first century. What's more, we also have to consider other megatrends, like globalization, urbanization, and demographic shifts in developed and undeveloped countries. The next few decades are expected to see major economic and social changes that influence how we define "work"—both what jobs we do and how we do them—in years to come. The impact of technological innovation on the workforce is particularly important for our youngest students, whose lives will bridge the twenty-first and twenty-second centuries; it will no doubt redefine what jobs are available, what the workplace looks like when today's girls are adults, and what skills will be required to be successful.

For example, while the fear that robots will dominate every profession is overstated, automation and artificial intelligence will no doubt fundamentally alter how many jobs are performed. The influence of the internet of things and digitization, a fancy term for what happens when everyday things—like a car part, an article of clothing, or even a piece of food—are transformed into bits and bytes for production by a 3-D printer, also means that our girls will have work we can't even imagine right now.

In fact, many of the jobs today's young professionals are most eager to pursue—from digital art curator to social media analyst—directly reflect the influence of these innovations and are jobs that didn't even exist five years ago. 65 percent of kids entering elementary school right now will as adults work in a job that hasn't yet been created. And the World Economic Forum recently estimated that 133 million new jobs may be created as a result of technological change.

Globalization and the increased interconnectedness that technology allows will also impact not just what today's kids do when they're adults but also how they do it. More and more, navigating the future workforce and the wider world will require that our girls be comfortable interacting with different cultures and people and be able to work with others regardless of background. They need the solid literacy, numeracy, and related skills one expects from a traditional school. But they must also successfully communicate, collaborate, and self-organize while navigating complex cultural dynamics or differences.

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What does this all of this mean for today's kids, or more specifically, for our girls? Are there things we need to do to prepare them for what is to come? How can we position them to thrive as this new future unfolds?

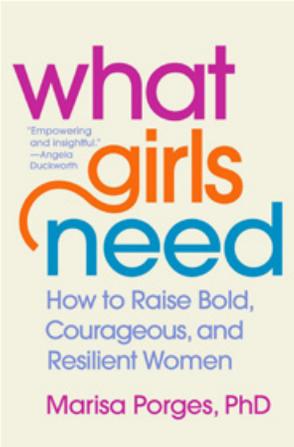
To effectively embrace the opportunities that will come over the decades ahead, our kids need a new set of twenty-first-century skills. Today's students must be taught to be adaptive learners skilled at abstract reasoning and flexible thinking in context, prepared for a world requiring human creativity, coordination, and decision-making that leverages information provided by artificial intelligence. They need the ability to analyze information, deal with uncertainty, and tackle challenges in multidisciplinary ways, no matter what job they pursue—or invent—when they're older. And they need to be flexible, collaborative problem solvers skilled at drawing connections across disciplines, communicating across boundaries, and adapting well in teams. Research shows our girls naturally do all of these things quite well, particularly if we nurture their innate talents from an early age.

The ability to identify, the support to nurture, and the wherewithal to use these important twenty-first-century skills is what our girls need for a still-being-defined future. 📖

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