CLOSING
THE GAP

A REPORT ON ADDRESSING THE GENDER GAP IN K-12 STEM EDUCATION

A NOTE FROM THE DIRECTOR
Martha McCabe

In mid-March of 2020, the KC STEM Alliance—alongside the rest of the world— paused.

All in-person events and programs were on hold as we pivoted into a new virtual world. Although difficult for all, the worldwide Covid-19 pandemic put the inequities in education under a glaring light, making it impossible to look away.

It called us to quickly assess gaps and advocate for those who might be left behind; to work together to close the gaps in STEM.

This report represents the first step in collective action toward closing the many gaps in STEM education—gender, race and differing abilities. It builds on the wisdom, expertise and experience of those passionate about building and supporting a talent pipeline of women in STEM.

We are grateful for the voices of the many who participated in the process, for those who shared their enthusiasm and commitment to this work. We are inspired by those who work every day in small ways to mentor or encourage a girl and in large ways to drive systemic change.

These findings and best practices are a celebration of that which is already working and an invitation to all of us to show up for girls and to work together as a community to close the gender gap.
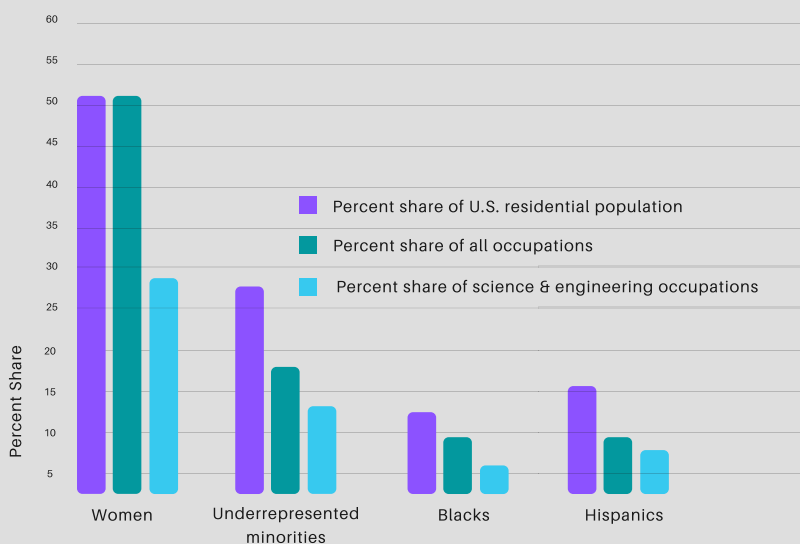
INTRODUCTION

Between 2003 and 2017, the number of women in science and engineering jobs climbed from nearly 1.3 million to nearly 2.0 million. Despite this progress, women still make up less than a third of the science and engineering workforce.

This gap is especially pronounced in some of the fastest-growing and highest-paying jobs, including engineering and computer science.[1]

Analyzing the Gap in Science & Engineering

Percent share of women, underrepresented minorities, Blacks, and Hispanics in S&E and all occupations

Legend:
- Percent share of U.S. residential population
- Percent share of all occupations
- Percent share of science & engineering occupations

Y-axis: Percent Share

X-axis categories: Women, Underrepresented minorities, Blacks, Hispanics

Source: The State of U.S. Science and Engineering 2020, NSB & NCSES

A gender gap persists in STEM fields, around the world and in Kansas City; in schools and in the workplace.

In summer of 2020, the KC STEM Alliance brought together 25 women and girls for a **five-part series of conversations that explored our region's efforts to close this gap**.

Moderated by Dr. Margery Sendze, the interactive webinar sessions used focus group methodology to look at key influences and success stories at each stage of STEM education —from kindergarten through high school.

Participants included community and corporate partners, mentors, parents, teachers, students and women with STEM careers and a webinar audience of 160.

The goal throughout was to understand which efforts are working and what more we should do to close the gap.

A methodical analysis of the narratives that came from these conversations uncovered themes that describe our progress and some best and next practices for closing the gender gap in STEM.
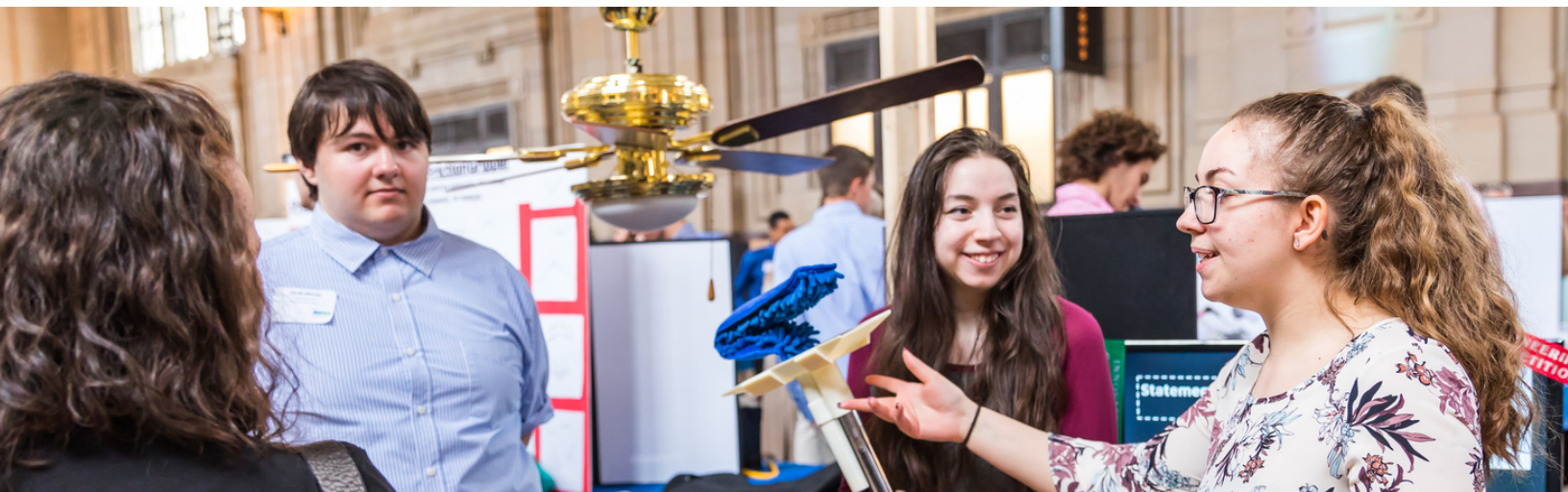
MEET THE MODERATOR
Margery Sendze, Ph.D.

Like many of her peers, series moderator Margery Sendze, Ph.D., did not follow a traditional path to a technology career.

Growing up in Cameroon, she struggled through early encounters with math and science due to an impatient teacher who took a punitive approach toward those who didn't readily grasp the content.

But thanks to her loving father, a caring sixth grade teacher and a nurturing extended family of aunties and uncles, she persisted and gained confidence.

After choosing an arts pathway in high school (to her father's dismay), she headed to the United States to study journalism and communications.

As she was settling into a job early in her career, she encountered a problem she didn't have the technology to solve. Remembering the faith her "village" had in her abilities, she challenged herself to find a creative solution. She enrolled in programming classes and learned how to code, and used her new skills to solve the problem at hand.

Margery and her father during her graduate school days.

Soon after, she transitioned into a career as a web developer, and later moved up to technology leadership roles within several organizations. But just as she felt in sync with her career trajectory, her father died.

"I suddenly understood that the one person who dared me to be anything I wanted to be, who believed in me and inspired me to look up to the sun every morning, had left me now to face the harsh realities of my experiences as a woman and as a person of color in my career and in life in general," Sendze says.

Her grieving culminated in a moment of clarity about just how few women, especially women of color, work in technology. Determined to be part of the solution, Sendze embarked on a doctorate in Industrial and Organizational Psychology, focusing her research on the experiences of women who stay in STEM professions for the long term. Her goal was to uncover the types of practices and policies organizations can use to improve retention.

Today, Sendze continues her work as a technology manager and promotes the inclusion, participation, and retention of girls/women and people of color in STEM. She is an adjunct faculty member at Grand Canyon University, serves on the KU Edwards Workforce Advisory Board and is an active member of various initiatives in the KC STEM community.

MEET THE
CLOSING THE GAP
PANELISTS AND SPEAKERS
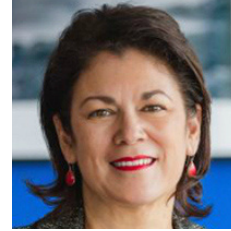
Cindy Wallis-Lage,
President, Water Business
Black & Veatch

Anne Einig, Director of STEAM
& Community Partnerships,
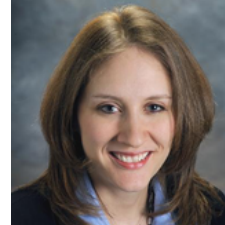Girl Scouts of NE KS & NW MO

Elementary School

Ericka Mabion,
K-8 iSPARK CTE Coordinator,
Kansas City Public Schools

Tammy Buckner,
CEO & Co-founder,
We Code KC

Joy Wheeler, CEO,
Girl Scouts of NE Kansas
& NW Missouri

Alicia Dwyer Cianciolo,
Aerospace Engineer, NASA
Langley Research Center

Ashlyn Dean
FIRST LEGO League Member
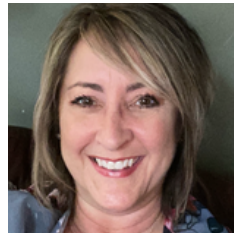and Fifth Grade Student

Middle School

Suzanne Weeks, R.N.,
Parent, *FIRST* robotics coach

Madi Weeks,
FIRST Tech Challenge Member
and Seventh Grade Student

Gina Schleimer,
7th-8th Grade Teacher,
St. Agnes Catholic School

Perla Weaver,
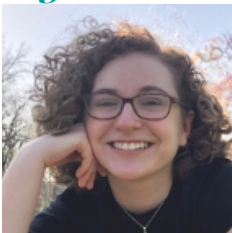Computer Science Faculty,
Johnson County Community College

Christina Chandler,
Teacher, Robotics Coach and
FIRST LEGO League Partner

Ragan Gum,
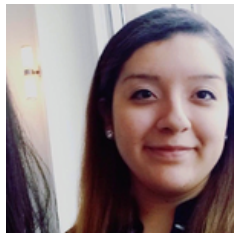Software Engineer, Cerner,
SWE-KC Member

High School

Carrie Robinson, 2020 Grad,
William Chrisman High School;
WSU Engineering Student

Dr. Cheryl Cooper,
Women in Security
(WINS) Mentors

Beth McCarthy
PREP-KC College
& Career Coordinator

Maria Franco, Engineering
Student, University
of Missouri-Kansas City

Haley Loftis,
Electrical Engineer,
Burns & McDonnell

Angie Ladwig,
Chemical Engineer,
Honeywell FM&T, SWE-KC

Closing Session: Reflections on What's Next
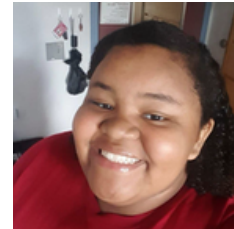
Natalie Lewis
Former Engineer and
Education Thought Leader

Karen Henderson, Engineering
Teacher, Femineers Sponsor,
Blue Valley NW High School

Natalie Self,
Executive Director,
STEMSTL

Chayanne Sandoval-Williams
Grandview High School Grad,
WPI CompSci Student

Angela Oguna Oruoch,
Electrical Engineer,
Black & Veatch

Lindsay Schmidt, P.A.
KU Medical Center
Founder, STEMM FIRE

THE FINDINGS

An analysis of these focus group sessions uncovered six themes that can help guide next steps for closing the gender gap in STEM in our community.

01 SHOW UP FOR THE GIRL

Go beyond responding to an invitation or a sense of responsibility to mentor, coach, advocate or teach. We must also be willing to push by advocating and being allies; pull by coaching because we see their potential; and enlightening by mentoring and teaching.

02 SEE THE GIRL

Find the gift in every girl by understanding what excites her, what empowers her, what kind of environments, programs and spaces foster growth, and how to invite her to participate.

03 INCLUDE ALL GIRLS

Take steps to understand for which girls the gap is closing, and for which the gap is growing; then target intentional measures to close those gaps.

04 PAINT THE PICTURE

Paint a picture of the possibilities by showing what STEM is, why it matters and illustrate the pathways girls can take to get there.

05 LET THEM STRUGGLE

Provide safe spaces and encourage girls to try out their skills. Let them explore, struggle, fail and ultimately find their way.

06 A COMMUNITY IMPERATIVE, NOW

The gender gap in STEM is a community imperative and this is a clarion call to galvanize the community around collective actions.

SHOW UP FOR THE GIRL

Closing the gender gap in STEM starts with a simple premise: We, collectively, must first show up for the girls in our lives.

When we show up for the girl, we go beyond responding to an invitation or a sense of responsibility to mentor, coach, advocate or teach. We must also be willing to push, pull and enlighten the girl. We push by advocating and being allies, we pull by coaching because we see their potential, and we enlighten by mentoring and teaching.

How we show up for the girl matters. For example, in mentoring girls, we can focus on real talk that facilitates connections. Be mindful that you are not just mentoring one girl; rather you are mentoring a girl who may potentially mentor other girls, who will in turn pass on their enthusiasm to even more girls.

Even a small individual moment has the power to change the trajectory of a girl's life. We can create a chain of meaningful connections by engaging in powerful moments through real conversations, one girl at a time.

CINDY WALLIS-LAGE ON THE POWER OF A MOMENT

"When I was 29, we were doing an interview for a project with a woman who was president of a minority business enterprise. I had only talked to her for a few minutes when she looked me straight in the eyes and said, "What are you doing to help the women that will come after you? ... Think of all the things women before you did so that you could be here; you owe them and you need to make it better for those that follow you."

I never saw her again ... but the influence she made was in telling me I needed to step it up and do things differently. It's always stuck with me. Those moments that we can have to change someone's life; she changed mine."

SHOW UP FOR THE GIRL

Who shows up for the girl matters, too. All girls need to see a representation of themselves in STEM to connect. **A diverse representation of mentors, coaches, allies, teachers, and advocates in STEM is an essential practice in closing the gender gap.**

Anyone who is willing and committed to showing up for the girl can make a difference, whether or not they have STEM experience.

Given their proximity and role, **parents can serve as chief advocates and champions for their daughters in STEM.** A good practice in closing the gender gap is for parents to partner with teachers, coaches and other allies who influence and encourage girls in STEM. This partnership can also be effective in orienting boys to the fact that girls are quite capable and can and do belong in STEM.

And men and boys can and do play a role in closing the gender gap. Men and boys can bring women and girls into conversations and activities where they are otherwise excluded. **Male mentors, educators, allies, and coaches should encourage and build confidence in girls who are exploring and finding their way in STEM.** These male influencers also have a role in encouraging boys to welcome girls as contributing members in various STEM-based activities.

Through powerful mentoring moments men and women alike can create meaningful impacts that will help close the gender gap in STEM.

How we show up, *who* shows up and *the role of each person* who shows up matter.

> **We need to teach our boys to let the girls take the lead when they want to …**
>
> **I found that we can create a welcoming environment for our girls by teaching our boys that girls are welcomed and they are capable.**
>
> *—Christina Chandler, teacher and FIRST Robotics coach*

SEE THE GIRL

Although showing up for the girl is the first step, it's not sufficient. We must truly see the girl. **We need to understand what excites her, what empowers her, what kind of environments, programs and spaces foster growth, and how to invite her to participate.** This level of understanding can only be achieved when we take the time to "find the gift" in every girl.

Educator Ericka Mabion says every child has an innate gift:

> " **Seeing and finding that gift in girls and helping them see it for themselves is a super power when it comes to building a STEM identity.**
>
> *—Ericka Mabion, educator, Kansas City Public Schools* "

When we find the gift, we can see the girl. However, **to find the gift, we must engage the girl by presenting direct and intentional invitations to participate.**

Personal invitations to take a STEM class or field trip have been effective. When thinking about how we invite girls, it's important to be patient and allow girls time to build confidence, especially in settings with boys.

Ask questions; gently pull them along. Recognize that invitations are necessary and worthwhile.

Girls are more likely to respond to an invitation when we make STEM fun. Making STEM fun includes enticing girls with in- and after-school programs and spaces that allow them to try new activities, to co-create and to work together as a team on challenging projects that stimulate the mind.

SEE THE GIRL

Sometimes convincing a girl to take a next step in exploring STEM comes from just one person expressing confidence in her. **A personalized approach helps girls understand that curiosity is a GIFT they should nurture, which leads to more tinkering, exploring and learning**, says Dr. Cheryl Cooper, founder of a nonprofit that promotes cybersecurity and IT opportunities for women. This approach also encourages girls to continue to explore their unique gifts and empowers and strengthens their STEM identities.

And **empowering girls empowers other girls**. As Girl Scouts executive Joy Wheeler says: "Girls working together realize how powerful they are individually and collectively. Girls will take more risks when other girls are encouraging them. The messages are, 'I did it; you can do it, too.' 'You are not alone.' 'We are proud of you.'"

Cooper notes that adults need to "train themselves to see gifts in their own children or students. (This includes) being mindful of the girls and paying attention to their perceptions, what they gravitate toward, and cater to their interests and internal passions. (When working with girls), **we need to ask: Where's the gap? Where's the gift? Then nurture the gift to close the gap**."

> **They were able to make robotics cool by being known as the robot girls. And they wore it like a badge of honor, and it kind of sets them apart as they grow in their development years of creating their identity.**
>
> *—Suzanne Weeks, parent and FIRST robotics coach*

INCLUDE ALL GIRLS

We can't fully answer the question of whether we are making progress in closing the gender gap in STEM unless we ask: "For which girls?"

To determine if we are making progress, **we must disaggregate the data and understand for which girls is the gap closing and for which is the gap actually growing**, says Natalie Lewis, an education thought leader with extensive experience in the Kansas City region.

"We need to be able to talk about the gaps for Black girls, for Hispanic girls, for transgender girls; we have to be able to talk in the specific and we have to be able to ask why," Lewis says. "Why is it not working? Why aren't these amazing programs that we know have worked…not working for all? Why are they not even accessible to all?"

"To understand what steps are needed to close the gap for all girls requires transparent and honest dialogue. "

"If we're going to be courageous enough and to be brutally honest; are we talking about all grade levels? Right now?"

Lewis says. "**There are under-educated, brilliant and underserved students sitting in our 11th and 12th grade classrooms. Are we talking about them, and are we talking about now?**"

In asking simple questions we can begin to see whether many of the amazing STEM programs being championed are available to all girls—especially those whose experiences intersect at the axis of multiple marginalized identities. These simple questions include: "How many girls? What's your impact on Black girls? What's your impact on Hispanic girls? What's your impact on girls in rural communities? Where are your programs?

Why are we not seeing an all-female robotics team winning the championship? Who is not focusing over here? What actions do we need to take to address the digital divide? What about all the specific gaps that are not being addressed?"

Changing the answers to these questions will take commitment and intentionality. Anything that is deserving requires effort and energy. We will need to put on our boots, **invest the time and commitment to go out there—to the urban core and rural areas—and make sure our efforts to close the gap include ALL girls.**

PAINT THE PICTURE

To encourage more girls to explore STEM, we must paint a picture of the possibilities. We must show what STEM is, why it matters and illustrate the pathways girls can take to get there.

It is important for girls to see STEM professionals who look like themselves and to know their interests are not bound by gender. **"You can't be it if you can't see it,"** PREP-KC's Beth McCarthy says. "**Students need to see people who look like them**. So females need to see other females, our students of color need to see students of color in the field" and we need to bring in "minorities and women working in those STEM fields…into the classroom, as well as workshops" to paint a picture of the possibilities.

Building a positive association with STEM requires early and consistent investments that nurture aspirations and build confidence. **Exposure to the diversity of careers and people working in STEM fields can help to break down barriers and paint a positive picture of STEM professions.** This can be achieved through in- and out-of-school community programs. Some examples of effective programs include one-to-one mentoring, job shadowing, career panels, classroom speakers, university tours and field trips.

These programs also serve as conduits for communicating why STEM matters and how girls can leverage math and science to navigate various STEM pathways. Highlighting females in high profile roles shows just how far they can go. When major corporations promote women in STEM and messages about its importance, it lends further credibility to our efforts to close the gender gap.

"So for our Hispanic girls, for our African American girls, for our LGBTQ students, that role model becomes huge. Because they're not used to seeing it.

—*Perla Weaver, Johnson County Community College faculty*

LET THEM STRUGGLE

As we take the time to paint the picture and show the girls how far they can go in STEM, we also need to **give them space to try out their skills—letting them explore, struggle, fail and ultimately find their way.** We need to value process over product and provide rich experiences that give girls the courage to try so they can build confidence.

Understanding that "failure is definitely OK" may provide girls an opportunity to get comfortable with being uncomfortable. Black & Veatch executive Cindy Wallis-Lage says sometimes, tapping into a girl's passion may require her to "figure out how [to] get out of her comfort zone."

This means we need to create a safe environment, then let them struggle. **A safe learning environment enables girls to experiment, struggle and quickly get back on track and find their way.** A safe learning environment is one where girls don't have to feel like they're the absolute best at something to believe that they can do it. It is an environment where there is transparency and honesty about the challenges and difficulties they may face, where they are encouraged "to do hard things," where they can make mistakes along the way, and where mistakes are treated as opportunities, not failures."

Some girls may second guess themselves, the Girl Scouts' Joy Wheeler says: "(**They may be) their own worst enemy … not believing they could do it perfectly right off the bat.**"

Normalizing failure is key, adds Ragan Gum, a software engineer at Cerner and active member of Society of Women Engineers-Kansas City. "Giving students the opportunity to fail, and also giving them role models (matters)."

Providing a safe environment where girls can struggle, fail, and find their way is key in enabling them to build resilience, confidence, and character and is critical in closing the gender gap in STEM.

> "Leave them on the struggle bus, allow them to fail, allow them to be frustrated. Teach them to use their words and articulate what they think and they feel. I don't want our girls to be told 'No.' I want them to be told, 'not yet.' This generates momentum instead of impediment."
>
> *—Ericka Mabion, Educator, Kansas City Public Schools*

A COMMUNITY IMPERATIVE, NOW

The gender gap in STEM is a community imperative that must be collectively addressed, now. Given the disruptions to existing programs and uncertainties caused by the pandemic, the call to action is urgent.

The pandemic has amplified the inequalities in access and the digital divide, which continue to frustrate community efforts in closing the gap.

"We do see the digital divide, we do see the gap, and I think COVID-19 has done an amazing job to show that there is a huge divide," says We Code KC founder Tammy Buckner.

We must "confront the brutal facts of our current realities," Natalie Lewis adds. "There are students who are being left further and further behind … we need to tackle [this] right now, almost like a triage."

Change must take place on parallel tracks—focusing on small and measurable steps in the short-term that can build to long-term systemic change. We need to be intentional; ensuring promising programs really work for all intended audiences. We need to start small, measure as we go and then scale up.

The pandemic does have one sliver of a silver lining: **The rapid shift to digital platforms has allowed students, parents and teachers to embrace new platforms for learning and collaboration.**

"There's a huge opportunity for community groups, for nonprofits and corporations to start getting even more involved in education," says STEMMFire founder Lindsay Schmidt.

Educators need up-to-date information on career pathways. **A coalition of partners who can focus on helping teachers to understand the skills needed for future jobs is an imperative in closing the gap.**

"(Although) doors closed because of COVID, thanks to technology and platforms such as Zoom or Google Meet, we are now able to communicate more directly with our peers or mentors across the world," says Angela Oguna Oruoch, a mentor and electrical engineer at Black & Veatch.
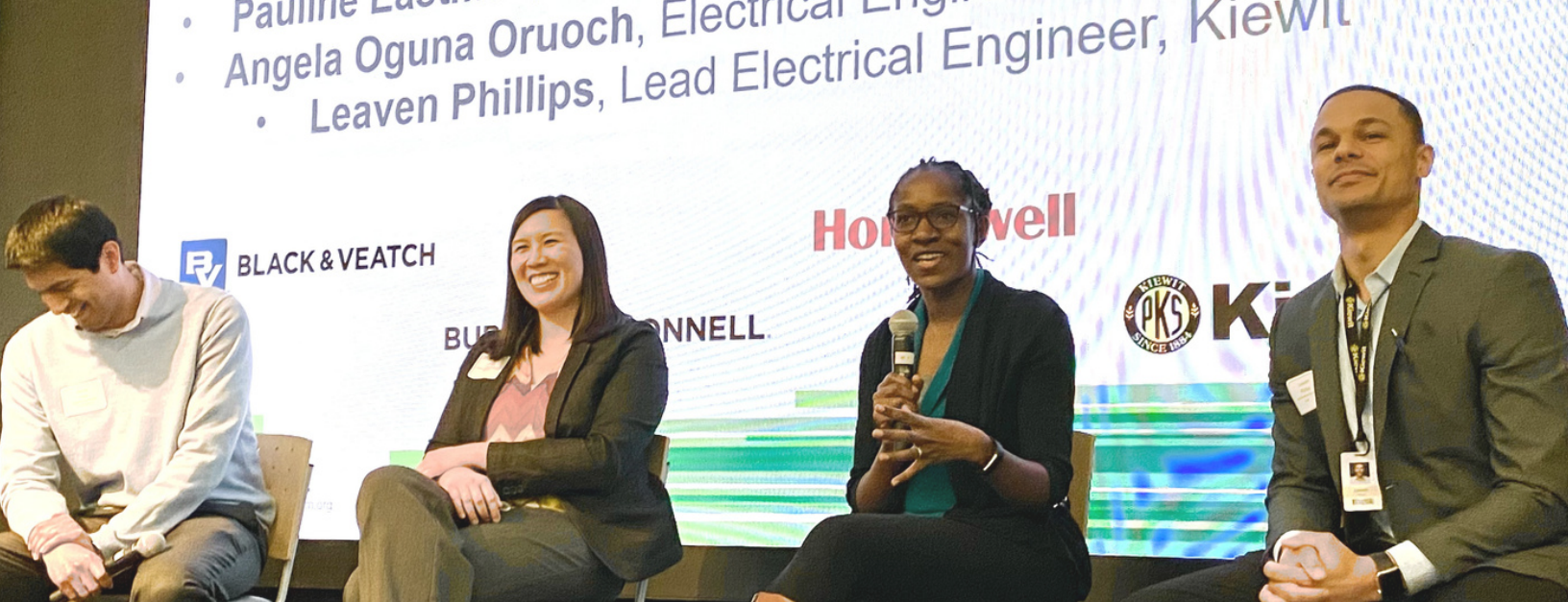
A COMMUNITY IMPERATIVE, NOW

Eliminating physical boundaries has provided a pathway for different partnerships with mentors, champions and advocates, including more opportunities to connect with near peers.

"I always say that if you can connect the pipeline, [with] a college student, she will have a stronger impact in talking to a junior in high school versus me," Oguna Oruoch says. "Because as much as I think that I'm still young and hip … that high schooler, when she sees me, she just thinks, 'Oh no, you have no clue what you're talking about.'"

Moving forward to include ALL girls in STEM with the layered challenges of a pandemic, racial injustice and economic hardships requires the entire community. **We must make the space and place to rethink how we build support and infrastructure at the neighborhood level to support our young people.**

"We need to make the case that the success of girls in STEM or boys in STEM or anyone in STEM or students is not just a teacher problem, it's not just a school building problem, and it's not just a parent problem," says Natalie Self, executive director of STEMSTL. "It really is a community problem (that must be addressed now)."

Making meaningful progress in closing the gender gap in STEM will require intentional and inclusive actions by ALL for ALL.
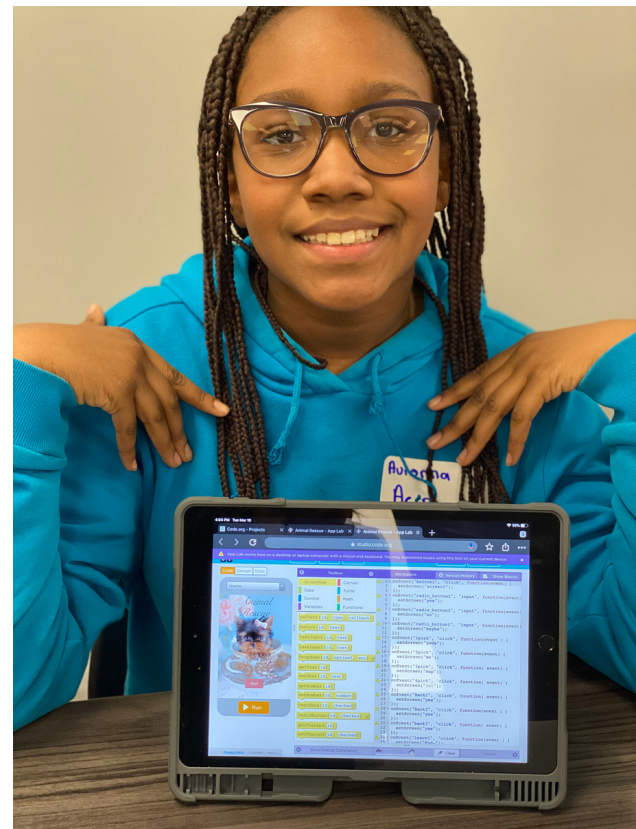
CONCLUSIONS + NEXT STEPS

Our audience and panelists agree that we've made progress in creating programs to reach girls in the K-12 STEM pipeline and that we have untapped potential.

Yet these findings also show significant socio-economic, racial and environmental barriers. Because these barriers exist at a system level, we need a community-focused approach that addresses the structural disparities to make meaningful progress in closing the gender gap.

Use a Community-Focused Approach to Address Barriers

A community-focused approach must begin with a heightened urgency, a better understanding of current assets and gaps, and a shift in mindset. Rather than focusing on specific programs and vertical activities, educators, institutions, practitioners and industry partners must pivot to collaborative community-based plans and actions poised to provide measurable progress.

The plan should not be too big—losing focus and becoming ineffective—or too narrow to create meaningful impact. This work should begin with establishing a working group that will define goals and parameters, as well as identify partners passionate about this work.

CONCLUSIONS + NEXT STEPS

This community-based approach should focus on:

01 Inclusive measures and interventions to understand and address the multilayered cultural and structural disparities contributing to the gender gap. As several participants noted, too often participants, programs, and specific activities designed to attract girls to STEM do not reach and attract ALL girls.

02 Intentional steps to better understand the diverse perspectives and barriers experienced by girls in STEM pathways. These steps will enable us, individually and collectively, to be better prepared to show up for the girls, see the girls, paint a picture of possibilities, and create environments where girls can explore, struggle and find their way.

03 Establishing accountability measures. Community accountability can be a powerful asset in determining how programs are structured and assessing whether we're actually achieving access for ALL. When we collectively identify, track and measure critical indicators, including incremental and iterative actions by community partners, we can make meaningful progress.

As Natalie Lewis says, "We need to bring brilliant minds and hearts together to have these conversations ...We need to be decisive about where we go from here."

NEXT & BEST PRACTICES
CLOSING THE GENDER GAP IN STEM

Show up for the girl.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Who is the right mentor right now? The right mentor can vary based on a girl's stage of development.

A great mentor at the right time can make an outsized difference.

Tap into parent networks to help find mentors who look like your students.

Engage near-peer high school mentors.

Set up speed networking, meet-and-greets and Q&A sessions with STEM pros.

Shift to opportunities for one-to-one mentoring connections where girls can build relationships.

**Coach girls to advocate for themselves** to practice perseverance and get the best experience.

Set realistic expectations.

See the girl.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Empower girls to empower one another: Form circles of girls where girls can work together and demonstrate pride in each other.

All-girl competitive teams in robotics or coding can get girls started in this space.
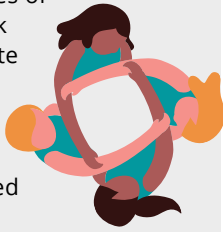
Encourage all-girl teams. This allows girls to support and mentor each other and helps remove self-imposed roadblocks. See Girl Scouts and Femineers for great examples!

Embrace peers as influencers. Allow girls to share experiences and aspirations. One or two confident girls can inspire and influence others, pulling them into STEM activities and programs.

Encourage self-organized support systems with other girls. This helps them build connections and relationships among their peers.

Provide girls-only classes to help girls quickly coalesce around shared learning outcomes.

Encourage and invite men to be mentors. Men are an important part of the ecosystem around mentoring young girls. Men influence a girl's ability to believe in and have confidence in herself.

See the gift in every girl. Take time to watch her in action. Talk with her to understand her approach and her interests, perspectives and passions. Then help her find the STEM pathways that will nurture her gift.

Personally invite girls to the "STEM table." Network with educators and community partners to socialize the invitation and get leads for hard-to-reach girls.

Include ALL girls.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Start early: Begin building the pipeline when girls are young.

Explore the untapped potential in rural and urban communities. Provide access and opportunity through STEM competitions and programs targeting underserved girls throughout our communities.

Increase cultural sensitivity and awareness by including individuals from diverse backgrounds at all levels in classrooms and programs.

Be patient: It may take more time to engage some girls.

Promote girls' STEM identity. Celebrate girls as they own and take pride in becoming known for their interests—as "robot girls," coders or budding engineers. A well developed STEM identity can enhance persistence.
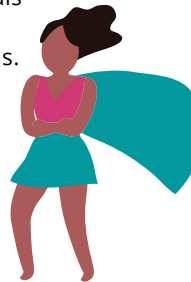
Engage industry partners to **begin recruiting in high school.**

Help girls make connections with women in STEM fields who look like them. Connect students of color with professionals from organizations like the Society of Hispanic Professional Engineers, National Society of Black Engineers, Urban League and others.

Identify multiple career pathways. Share info about certificates in cyber-security, web development, etc., including those available directly after high school.

Go beyond gender. Track progress for those whose identities intersect at the axis of race, sexuality and other marginalized identities.

Engage ALL girls—not just the "gifted"—in STEM programs.

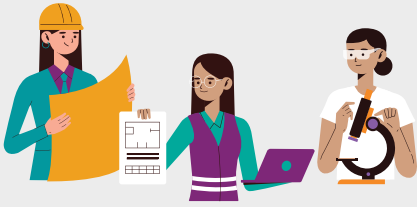**Put the A in STEAM:** Arts can draw in a more diverse pool of girls.

Change educator mindsets to change the culture: Challenge assumptions and blind spots about which gender is naturally predisposed to do well in STEM subjects.

CLOSING THE GENDER GAP IN STEM

Paint the picture.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Show girls their interests are not bound by gender by providing early exposure to women working in a diverse array of STEM fields.

Don't forget to make it fun!

Consistently illustrate the diversity and breadth of STEM pathways to help break down barriers early on.

Be intentional about promoting the possibilities in STEM. Provide information about the types of jobs, opportunities and innovation experienced in STEM careers.

Deepen interest and awareness with field trips, job shadows and conversations with industry professionals about a day in the life of a female STEM professional.

Engage diverse groups of female professionals, high school and college students so every girl has role models who look like her.

Let them struggle.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Embrace the struggle bus. Do not jump in every time girls encounter difficulties, express frustration or fail. Guide them to articulate what they are thinking and feeling and encourage them to learn and turn those feelings into action.

Actively manage against self-imposed ideas and boundaries they may have about their abilities to do well in math, build a project or any other limitations they communicate.

Help girls build resilience. Empower girls to model the way for other students who may be struggling and encourage those who are struggling to problem solve with other girls.

Encourage activities that build courage and confidence. The window between K-4 is narrow; the best way girls can build confidence is to have the courage to try and try again as they develop perseverance.

DO IT FOR YOURSELF

Let them struggle, but **provide reassurance in girls' knowledge and decisions**—especially when they are working on a task. This helps to build confidence and resilience.

Normalize failure by giving them permission to fail. Let girls know they do not have to be perfect, and that making a mistake is actually part of learning, growing and building resilience.

Encourage girls to reframe their mindsets by having a positive outlook. Teach them to see the possibilities, not the limitations; to rise to the challenge and succeed no matter how difficult the learning opportunity may be.

Get the tools in their hands early. Let them build and let them try, experiment and explore. When you trust them with the tool, it builds their confidence and inspires them to experiment.

Clearly communicate the outcome you expect so they understand the challenge. Reassure them of their ability to do it, and then provide a safe environment to let them try, fail and experiment.

Engage mentors and a support network of college students and professionals to provide realistic expectations of STEM pathways, careers and challenges. This network can serve as a sounding board that may help girls overcome those challenges and build resilience.

Teach girls how to set goals, achieve them independently, practice self discipline and take responsibility.

A community imperative, now.

ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL

Provide access for ALL girls now to help to ensure they do not drop further behind the boys.

Encourage professionals to give back to their communities by engaging and showing up to help in closing the gap.

Create computer science pathways to address false choices in course selection that force girls away from computer science classes.

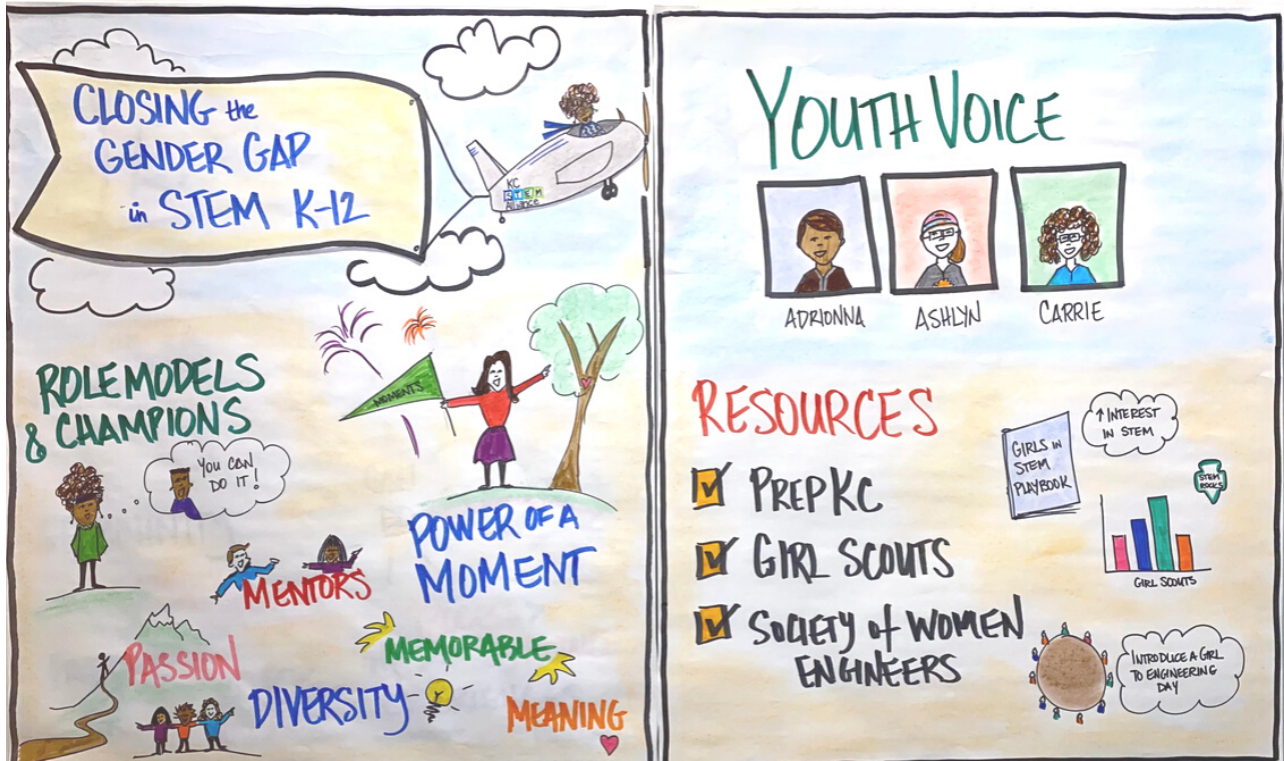Help teachers **understand the STEM skills and pathways** needed for the 21st-century workforce.

Teachers should be included when community and industry partners discuss strategies for closing the gap. Their perspective is essential to fully understanding the challenges.

WWW.KCSTEM.INFO/GENDERGAP

# CLOSING THE GAP
OPENING SESSION

KICKING IT OFF

In the first of five conversations about how our community is engaging girls in STEM during their journey through K-12, **Cindy Wallis-Lage**, President, Water Division, Black & Veatch, provided the keynote on the power of a moment, with others joining in to provide a sneak peek at what was to come.

THE RECORDING

www.kcstem.info/PowerofMoment

CLOSING THE GAP
THE ELEMENTARY YEARS
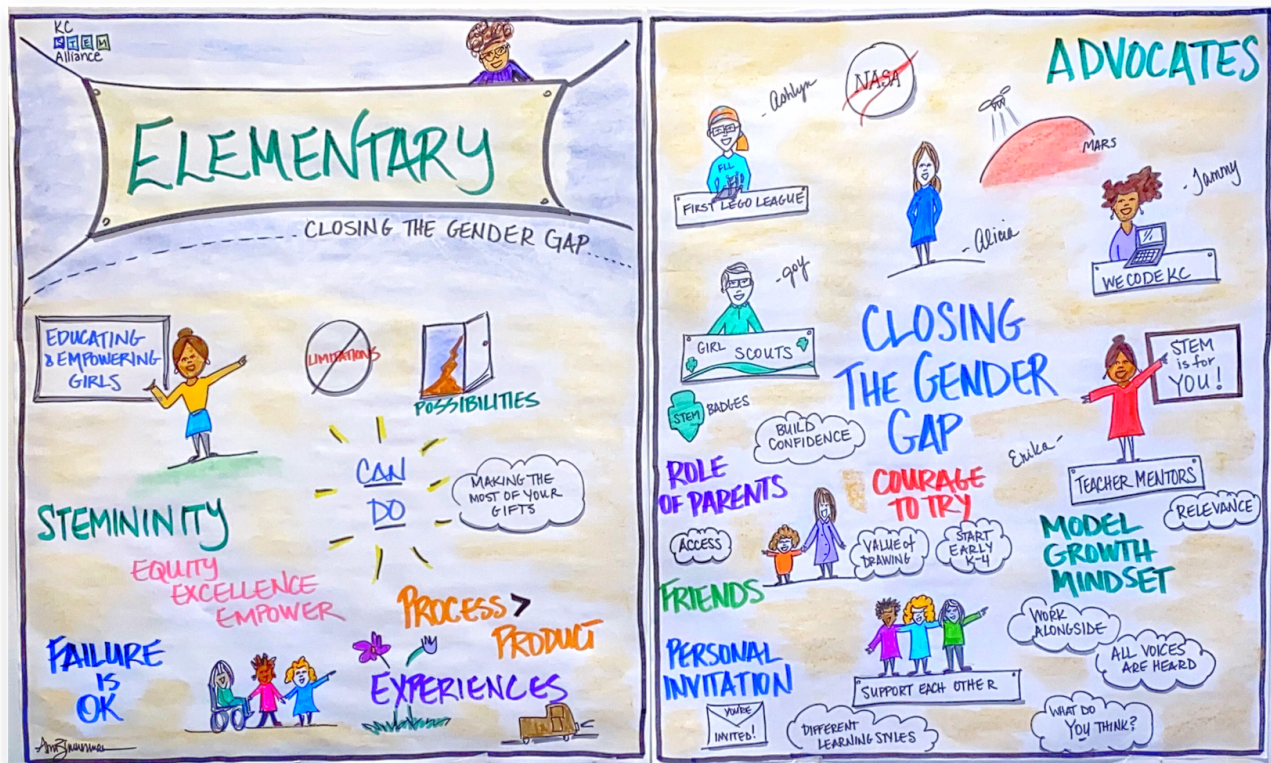
THE PANELISTS

Ericka Mabion, iSpark and Career & Technical Education Coordinator for Kansas City Public Schools, offered a keynote talk on educating and empowering girls during their elementary school years.

Ericka is a passionate advocate for STEM, technology integration and helping fellow educators create engaging project-based learning experiences. She discovered the benefits of integrating technology while teaching special needs and English Language Learners. She has a master's in Curriculum and Instruction from Capella and is a Project Lead The Way-Lead Teacher/Trainer, Google Certified Trainer, Digital Learning Coach and credentialed to provide professional development for Code.org and Scratch.

The focus group also included a conversation with a panel including:
- **Tammy Buckner,** CEO and founder of We Code KC;
- **Ashlyn Dean,** student and Girl Scout;
- **Alicia Dwyer Cianciolo**, NASA Langley Research Center aerospace engineer; and
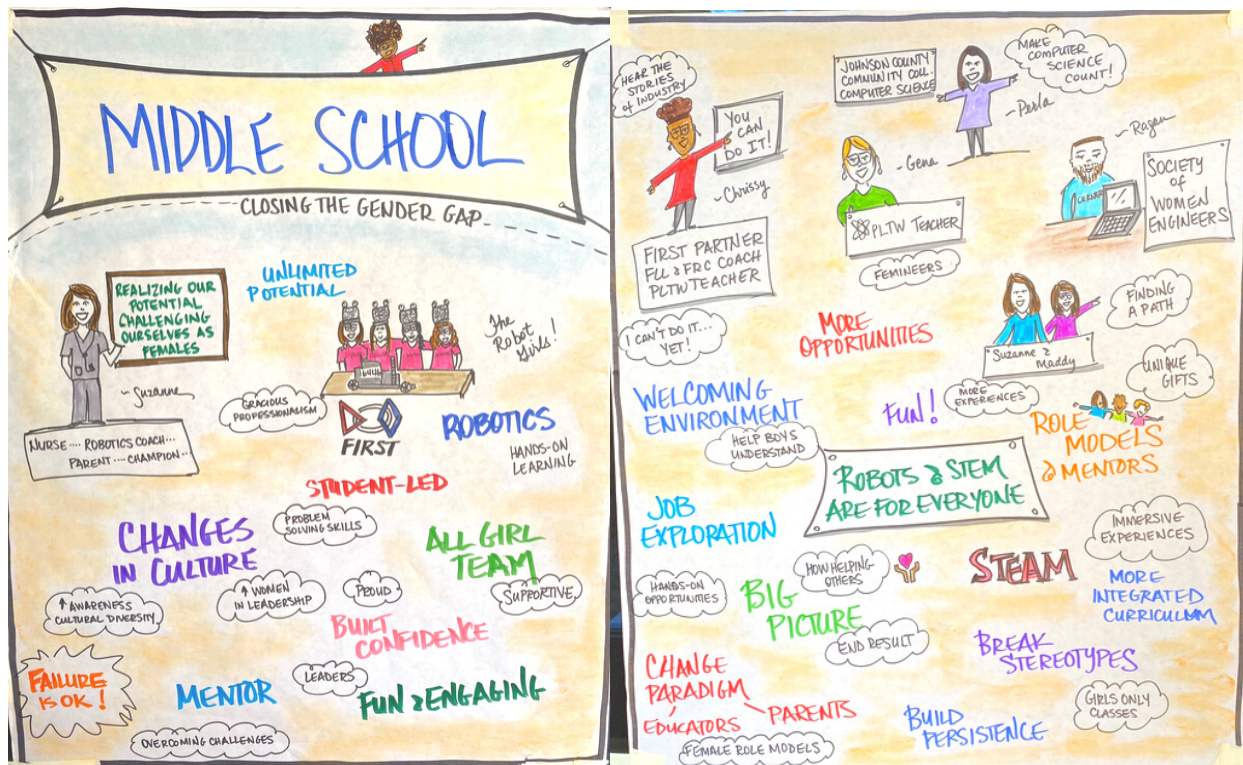- **Joy Wheeler**, CEO of Girls Scouts of NE Kansas and NW Missouri.

THE RECORDING

Watch this episode at
www.kcstem.info/elementary

THE RESOURCE LIST

Find recommendations for books, movies, games and more: kcstem.info/ElementaryYearsResources

THE PANELISTS

Suzanne Weeks, a parent and robotics team coach for the all-girls Probots *FIRST* Tech Challenge team, provided the keynote.

Panelists included:

- **Madi Weeks**, *FIRST* Robotics team member and Suzanne's daughter;
- **Christina Chandler**, a Project Lead The Way computer science teacher in the Center School District, *FIRST* robotics coach and regional *FIRST* LEGO League partner;
- **Gena Schleimer**, STREAM and Innovation Lab Coordinator at St. Agnes Catholic School;
- **Perla Weaver**, Associate Professor and Department Chair of Computing Sciences and Information Systems at Johnson County Community College; and
- **Ragan Gum**, a Cerner software engineer and STEM advocate active in the Society of Women Engineers.

THE RECORDING

Watch this episode at
www.kcstem.info/middleschool

THE RESOURCE LIST

Find recommendations for books, movies, games and more: kcstem.info/MiddleSchoolResources

CLOSING THE GAP
HIGH SCHOOL

THE PANELISTS

Carrie Robinson, a recent graduate of William Chrisman High School in the Independence School District, shared the keynote as she was preparing to take the STEM skills she developed in high school to Wichita State University, where she is studying engineering technology with a concentration in civil/environmental engineering.

The other panelists included:
- **Haley Loftis**, a staff electrical engineer in the Energy Division at Burns & McDonnell;
- **Beth McCarthy**, College & Career Program Coordinator for PREP-KC;
- **Dr. Cheryl Cooper**, a cybersecurity awareness and education consultant who works for a major telecom company;
- **Maria Franco**, a UMKC mechanical engineering student who works at the Hispanic Development Fund; and
- **Angie Ladwig**, Technical Manager of Systems Engineering at Honeywell and a girls in STEM advocate and volunteer.
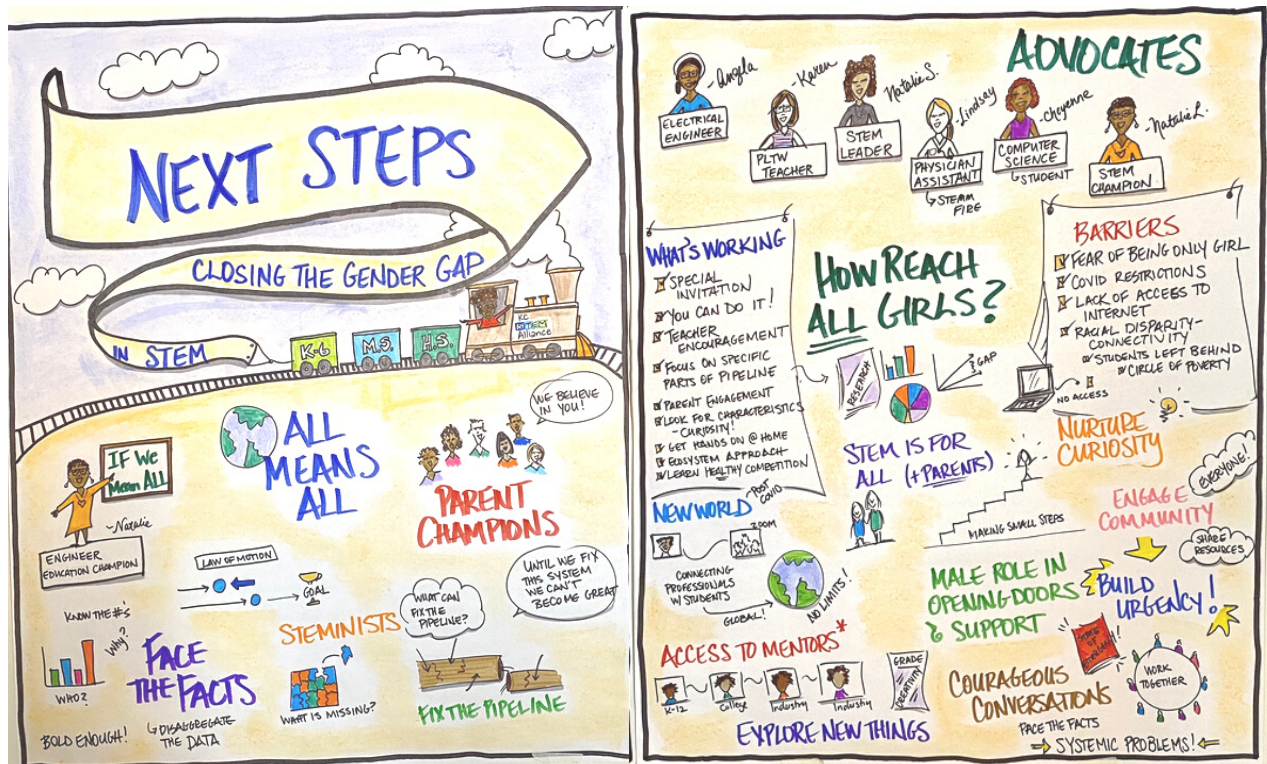
THE RECORDING

Watch this episode at
www.kcstem.info/highschool

THE RESOURCE LIST

Find recommendations for books, movies, games and more: kcstem.info/HighSchoolResources

CLOSING SESSION

THE PANELISTS

This conversation wrapped up the five-week series with a keynote address from **Natalie Lewis**, a chemical engineer, educator, former school board member and education advocate.

Joining her for the panel discussion:
- **Lindsay Schmidt**, founder of STEMM FIRE Foundation;
- **Karen Stohlmann Henderson**, Project Lead The Way teacher at Blue Valley Northwest High School;
- **Chayanne Sandoval-Williams**; Former *FIRST* Robotics and Project Lead The Way Grandview High School student and current computer science student at Worcester Polytechnic Institute;
- **Angela Oguna Oruoch**, Electrical Engineer at Black & Veatch; and
- **Natalie Self**, executive director of STEMSTL.

THE RECORDING

Watch this episode at
www.kcstem.info/ClosingSession

METHODOLOGY

We used a focus group approach to conduct this series of webinars via Zoom sessions over five consecutive weeks. The hallmarks of a focus group approach include open-ended questions designed in a semi-structured format to guide our understanding of participants' thoughts, feelings and behaviors based on their experiences.[2] These sessions included more than 160 webinar participants over the course of the series.

Our focus group protocol included five semi-structured questions and five focus group sessions consisting of five to six participants each. This structure enabled us to gain invaluable insights, depth, and diverse perspectives on best and next practices in closing the gender gap in STEM from the participants.

Focus group participants were recruited from diverse STEM sectors. A total of 28 individuals took part, representing educators, students, industry professionals, community partners and program providers to add new voices to the conversation.

Participants were informed of the purpose of the webinar and given the opportunity to opt out from the focus group discussions at any time.

The moderator used probes to ensure all participants' voices were heard and diverse perspectives were shared. All focus group sessions were recorded and transcribed. The project team audited the transcripts and used a coding scheme to identify sub-themes, which were further refined through analysis and discussion.

The team compared these themes across all five sessions, ultimately identifying the six core themes as shown in the table on page 7. The core themes represent key ideas that emerged across all five focus groups. Each theme summarizes the shared perspectives of the 28 participants about the current progress, best and next practices in closing the gender gap in STEM.

References:

[1] National Science Board. (2020). Science and engineering indicators 2020. NSB-2020-01. Alexandria, VA: National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsb20201/u-s-s-e-workforce

[2] Krueger, R. A., & Casey, M. A. (2000). Focus groups: A practical guide for ed.). Thousand Oaks, CA: Sage.

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