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Empowering Girls in STEM:

Insights for an Equitable Future

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As one of Canada's leading youth STEM outreach organizations, Actua has spent over 25 years dismantling barriers to science, technology, engineering, and math nationwide. Actua engages over 500,000 youth annually across 600 communities, nurturing a passion for STEM through hands-on learning.

A cornerstone of its outreach efforts is Actua's National Girls Program (NGP), a bold initiative addressing gender inequity in STEM. Now in its third decade, the NGP engages 25,000 girls each year, along with an additional 225,000 reached through other programming. This program builds confidence, supports mental health, and strengthens science and digital literacy, while offering meaningful exploration of topics like AI and online safety, all guided by relatable and inspiring mentors.

Despite progress, Canada continues to grapple with a significant gender gap in STEM education and careers. Women are nearly 30 percent less likely than men to enroll in postsecondary STEM programs, a disparity largely attributed to factors beyond academic performance, including limited access to role models, lack of confidence, societal norms and structural barriers[1]. By offering safe and engaging environments, Actua's all-girls programs aim to improve STEM skills, interest and confidence in girls and gender-diverse youth, ultimately contributing to a more equitable and innovative future.

To inform and evolve NGP, Actua convened a roundtable discussion with experts and practitioners in November 2024, followed by a dialogue with Actua network members in January 2025. The end goal was to capture a set of recommendations for consideration by Actua and sharing by the broader outreach community.

[1] P. Chan, T. Handler and M. Frenette (2021). Gender differences in STEM enrolment and graduation (Ottawa: Statistics Canada). https://www150.statcan.gc.ca/n1/pub/36-28-0001/2021011/article/00004-eng.htm

Participants in our roundtables discussed the persistent barriers affecting girls' full participation in STEM fields and centred the discussions around four pivotal themes, chosen for their impact on girls' engagement and success in STEM:

- **Building a sense of STEM identity in girls**
- **Fostering inclusive innovation**
- **Addressing risks in the digital arena and the proliferation of AI**
- **Supporting girls' mental health needs**

Actua will integrate recommendations from these discussions into programming, advocacy and resource development to create more equitable and supportive STEM pathways for girls.

ROUNDTABLE EVENT DETAILS

The first roundtable took place in November 2024 and included the following participants:

- **Jennifer Flanagan**, President and CEO, Actua
- **Jennifer Ladipo**, National Programs Manager (National Girls Program & Black Youth in STEM Program), Actua
- **Virginia Hall**, Senior Director, Research and Risk, Actua
- **Bissy Waariyo**, Associate Director, Research & Development, Actua
- **Madeline Sialtsis**, Coordinator, Network Member Services, Actua
- **Anthonia Ogundele**, Founder & Executive Director, Ethos Lab
- **Carson**, Marketing Coordinator, Youth Facilitator, Youth Speaks
- **Janos Botschner**, Behavioural Scientist, Community Safety Knowledge Alliance
- **Jenny Yuen**, National Partnerships & Government Relations, Kids Help Phone
- **Raphelle Jean-Baptiste**, Former Instructor, UOttawa Engineering Outreach
- **Shelby Amponsah**, Engineering Community Outreach, McMaster University
- **Vandana Kattar**, Global Diversity and Inclusion and Environment, Social and Governance, TD Bank Group
- **Vannesa Vakharia**, CEO, The Math Guru

ACTUA'S NATIONAL CONFERENCE 2025

The second roundtable was then held in January 2025 during Actua's annual national conference. This session brought together 24 attendees, including Actua network members from across Canada, select educators, and Actua staff. Participants shared insights, trends and experiences related to engaging girls in tailored STEM programming in their communities.

ABOUT ACTUA'S NATIONAL GIRLS PROGRAM

Actua's National Girls Program inspires girls and young women to fulfill their unique and important role in STEM. Actua's university-based network members deliver all-girls camps, clubs, workshops and events across Canada. They are led by women and gender-diverse instructors and welcome female STEM professionals as role models. The program's aim is to build social connections, break down deeply rooted stereotypes and create safer spaces for girls to design, build, experiment and grow their confidence.

Actua's all-girl programs welcome transgender girls, non-binary and Two-Spirit youth, and it is worth noting that in addition, Actua recognizes and supports the distinct program needs and partnerships for queer youth.

Discussion Overview & Recommendations

The following themes emerged during our two round table discussions.

1. BUILDING A SENSE OF STEM IDENTITY IN GIRLS

STEM identity – the sense that science and technology are a natural part of one's life – is crucial for girls' long-term engagement in STEM. Its absence can influence decisions that girls make, with long-term ramifications, such as whether to take math and science courses in high school or pursue STEM in post-secondary education. Without a sense of STEM identity, girls may also be more vulnerable to social pressures that discourage STEM participation.

The roundtable explored how parents may unintentionally steer girls away from STEM by discouraging risk-taking, which can undermine their confidence. While boys are often encouraged to take risks, girls may be guided toward caution, reinforcing risk aversion. Additionally, a perceived conflict between femininity and STEM can lead girls to hide parts of themselves or feel they don't belong in these fields.

In addition to engaging parents to better understand their influence in this area, an effective strategy to strengthen STEM identity in girls includes integrating STEM into girls' existing interests and everyday experiences. From the toys they play with, the hair products they use or the sports they play – enriching these things with connections to science, technology, engineering, and math, and ensuring that they are adding to, not taking away, from girls' other identities, will help strengthen their sense of belonging and capability in these fields.

RECOMMENDATIONS FOR BUILDING A SENSE OF STEM IDENTITY

1. Enhance instructor training and role model guidance to include a focus on STEM identity and promote the integration of STEM learning with girls' daily activities and interests.

2. Develop a compelling rationale for NGP, designed to inform parents and caregivers about the program's significance, the benefits of girls' participation in STEM, and the long-term advantages and opportunities for their daughters.

3. Develop resources that feature female STEM role models with relatable, real-world connections to girls' everyday lives.

4. Review current research and recommendations for improving boys' attitudes and beliefs regarding girls' competence and success in STEM.

2. FOSTERING INCLUSIVE INNOVATION

Building an inclusive innovation economy means challenging the societal systems that have long concentrated power and privilege, especially in STEM, among men. These entrenched norms leave little room for diverse experiences, creativity, or vulnerability, and continue to shape who gets to participate in innovation. Women's contributions are essential to creating technologies that work for everyone, yet significant barriers persist.

Research from the DAIS reveals that women, especially Indigenous and racialized women, are underrepresented in Canada's most innovative industries and often excluded from key decision-making roles[2]. Many report feeling less encouraged to share ideas or innovate, particularly Black and other racialized women[3].

The roundtable examined Canada's progress in supporting diverse innovators and the potential of NGP to help close gaps in participation, representation and leadership. Participants pointed to the systemic inequities and male-dominated norms that continue to make women feel like outsiders in innovation spaces. These signals start early: girls are still often steered away from advanced science and math in high school. Gatekeeping requirements, like mandatory physics for engineering, further narrow the pathway. Combined with gendered expectations that reward perfectionism and risk aversion, these barriers suppress girls' confidence and creativity. Tailored programs that confront these realities are essential to ensuring girls can fully engage in and shape Canada's innovation future.

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[2] A. Lockhart and V. Vu (2024). Canada's Got Tech Talent: Diversity of Canada's Tech Workers (Toronto: DAIS) https://dais.ca/reports/canadas-got-tech-talent-chapter-2/

[3] MaRS cited in D. Munro (2019) "Why Canada Needs a More Diverse Tech Workforce" (Waterloo: CIGI) https://www.cigionline.org/articles/why-canada-needs-more-diverse-tech-workforce/

RECOMMENDATIONS FOR FOSTERING INCLUSIVE INNOVATION

1. Actua should support its network members with more programs like "GoPhysGirl" (an Ontario Network of Women in Engineering or ONWIE program), designed to make physics more accessible and engaging for girls, and find multiple ways to introduce physics concepts to younger ages.

2. Actua should equip its network members to guide girls at key educational decision points – like when they choose science and math courses in high school – by providing information on the opportunities and potential barriers within various STEM pathways.

3. Strengthen Actua's role in sharing research and advocating for the removal of systemic barriers to innovation in Canada. Specifically, continue to address educational barriers that limit girls' participation in innovation-driven fields, such as restrictive physics prerequisites for engineering programs, and promote the importance of fostering a culture where failure is a valued part of learning.

3. ADDRESSING RISKS IN THE DIGITAL ARENA AND THE PROLIFERATION OF AI

The evolving digital landscape and rapid growth of AI present both new opportunities and challenges for girls navigating online spaces. While these technologies offer pathways for skill-building and future careers, girls also face online abuse, gendered disinformation and mental health impacts such as stress and anxiety.

The roundtable examined the potential for NGP to address these online safety concerns by equipping girls with the knowledge and confidence needed to engage safely and meaningfully in the digital world. They also noted that AI is only as good as the data it learns from and therefore reflects the biases of its creators, often excluding or misrepresenting girls' experiences. This lack of diversity in AI development contributes to digital gender-based violence and the spread of harmful ideologies. Furthermore, widespread misunderstandings about AI, especially among parents, can fuel fear about AI tools. Programs like NGP are vital for demystifying AI, enhancing digital literacy, and ensuring girls' perspectives remain central in discussions around online safety and innovation.

RECOMMENDATIONS FOR ADDRESSING RISKS IN THE DIGITAL ARENA AND THE PROLIFERATION OF AI

1. Equip girls with digital literacy, responsible AI skill-building and critical thinking skills to identify misinformation and trusted online content.

2. Demystify AI through relatable examples and resources that explain its workings and showcase AI career opportunities that can get girls excited about an AI-driven future.

3. Integrate humanities education with technology learning to foster a holistic understanding of AI and the value of the human dimension.

4. SUPPORTING GIRLS' MENTAL HEALTH NEEDS

A healthy and productive education depends on good mental health, yet research shows girls consistently report poorer mental health than boys. Statistics Canada data reveals that girls and women reported low self-perceived mental health more often than boys and men both before and during the COVID-19 pandemic. These challenges are even greater for girls with intersecting identities[4].

The discussion highlighted the need to base support on girls' expressed needs rather than assumptions, noting that some lack a trusted adult and benefit from peer-led approaches. Normalizing failure alongside celebrating success in STEM is vital to providing a realistic view of the learning journey. Encouraging reflection on setbacks and equipping girls with coping strategies can help build confidence and resilience.

RECOMMENDATIONS FOR SUPPORTING GIRLS' MENTAL HEALTH NEEDS

1. Continue to create safe, peer-driven learning environments where girls and gender-diverse youth feel free to express themselves, take risks and share challenges without fear of judgment.

2. Be open about the realities of working in STEM, helping participants develop the tools and mindset needed to manage obstacles and remain on their STEM journey.

[4] https://www150.statcan.gc.ca/n1/pub/82-003-x/2024007/article/00002-eng.htm

Next steps

Actua is integrating many of the recommendations from the roundtable discussions into its work, both within NGP and other programming. This includes the AI Ready Project, which equips youth, educators and parents with the AI skills needed to thrive in an AI-driven economy. Actua will also be sharing the results of the roundtable and recommendations more widely to advance the field of gender equity in STEM writ large.

A third roundtable discussion is planned for fall 2025 to continue the discussion on barriers to girls' participation in STEM and to find solutions as the landscape of STEM equity in Canada continues to evolve.

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Support for Actua's National Girls Program is essential to advancing the tangible actions needed to ensure girls across Canada can thrive in STEM. Continued investment directly enables the development of new learning resources, enhanced educator training and stronger advocacy efforts. By funding programs and advancing policies that champion girls' equitable participation in STEM, supporters contribute to a more inclusive and innovative future in Canada.

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TD READY COMMITMENT

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