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EVIDENCE BRIEF

The **Social Sciences and Humanities
Research Council** in collaboration
with the **Future Skills Centre**

SSHRC's Imagining Canada's Future initiative mobilizes social sciences and humanities research to address emerging economic, societal and knowledge needs for Canada, and help guide decision-making across all sectors toward a better future. This evidence brief addresses the Future Challenge Area of: **Skills and Work in the Digital Economy**

Harnessing the digital economy for women of colour in Canadian undergraduate science, technology, engineering and mathematics (STEM) programs

This report was produced as part of a project funded by the Future Skills Centre (FSC), with financial support from the Government of Canada's Future Skills Program.

FSC is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint ADE, and The Conference Board of Canada

The opinions and interpretations in this publication are those of the author(s) and do not necessarily reflect those of the Future Skills Centre or the Government of Canada.



About the project

We have known for quite some time that Canada has a diversity problem in STEM. Canada has groups of people who are significantly underrepresented in the STEM fields. One of the most underrepresented groups is women of colour. This underrepresentation is an equity problem—a significant number of women of colour do not have access to the benefits of STEM—and this is an innovation problem, as more diversity leads to a diversity of ideas, which leads to innovative solutions to our most pressing issues. Canada essentially loses out on the potential unique STEM contributions of its underrepresented people. Researchers have used the metaphor of a pipeline to describe the pathway between schooling and an eventual STEM career. Efforts to solve the underrepresentation problem have so far mostly focused on recruitment into the pipeline. However, the pipeline is leaky, particularly in postsecondary STEM education. Women of colour are transferring out of their undergraduate STEM programs in droves.

The overarching objective of our project is supporting a more diverse, equitable and inclusive STEM field. Through a systematic literature review we:

- identified antideficit-based strategies that support the retention of women of colour in their postsecondary STEM programs;
- synthesized these strategies to understand their effectiveness;
- assessed the state of the field in Canada regarding strategies and retention efforts for women of colour in STEM;
- identified Canadian research gaps and research priorities;
- synthesized the literature to understand how the digital economy can be leveraged to equitably support retention efforts in STEM.

Key findings

Women of colour face multiple barriers to completion in their STEM programs. Our research has identified a significant gap in Canadian data in this area. It is an imperative of equity for Canadian policy-makers and researchers to mobilize to solve this data gap.

At present, many people already underserved in our education system have also been ignored in research and data collection. Canada is a unique context with unique policies and cultural climates. While we can draw on the robust research generated from United States sources, this can only be a stopgap measure until we understand our own Canadian context and find solutions to specifically Canadian issues.

Through this research we created a clearinghouse of strength-based and antideficit strategies that are successful for supporting the retention of women of colour in STEM. The most successful strategies are antideficit. There is a difference between deficit strategies that are remediation focused and antideficit strategies that are enrichment focused. When an intervention is focused on remediation, it centres the student as a problem. An intervention focused on enrichment, on the other hand, is inclusive and empowering and values the prior background and experiences of the students. Deficit remediation strategies are inequitable and cannot develop capacity or long-term solutions.

There are STEM culture barriers that exist across institutions, and barriers that are specific to institutions. We found that efforts that tackled both types of barriers were most successful. Many institutions and organizations offer programs to support women of colour in STEM, for example, providing scholarships and financial incentives and organizing career clubs. This is commendable and does aid with access to STEM. However, developing inclusive cultural norms and institutional supports that develop and reinforce STEM identity and sense of belonging is imperative for creating the environments students need to persevere in their programs.

The digital economy can be both a tool of support to create equitable learning environments and leveraged to empower learners in STEM. There have been two ways of leveraging the digital economy to support retention. One way supports STEM learning and STEM course development, and the other empowers learners to develop digital skills. Both ways of leveraging the digital economy have the potential to have high and long-lasting impacts. Ideally, policy changes will incorporate both types of digital strategies into postsecondary STEM learning environments. Courses, programs and clubs can be redesigned to support this new learning.

Policy implications

- There is an immediate need for research to be conducted: (1) gathering pan-Canadian data on retention and (2) gathering data on the specific experiences of women of colour in their STEM programs.
- Actionable strategies for policy-makers, institutions and faculty to focus on include targeting efforts in the first two years, placing the strongest faculty in introductory and first-year courses, establishing mentorship programs, supporting faculty to develop culturally responsive pedagogies, and embedding research experiences and digital literacies across courses and programs.
- Each Canadian institution of higher education should conduct internal reviews to identify their own specific barriers and answer how they can provide learning spaces that develop STEM identity and sense of belonging.
- A policy priority should be for STEM programs to intentionally create learning opportunities and goals that integrate their STEM courses with real-world digital literacies, including exploring real-world STEM problems of social significance through digital literacies.

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FURTHER INFORMATION

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SSHRC is a funding agency of the Government of Canada. Through research grants, fellowships and scholarships, SSHRC supports research that provides key insights on the social, cultural, environmental and economic challenges and opportunities of our ever-changing world.

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