

CANADA FOUNDATION FOR INNOVATION

Youth and science: A promising future

Report on the proceedings from a national conversation

Hosted by the Canada Foundation for Innovation
and Acfas on June 8, 2022

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Why does Canada need a national conversation on youth and science?

Scientific literacy has never been more important to our society. We are living in a public environment where social media, fake news and unreliable sources can strongly influence the development of attitudes and belief systems among young people that can stay with them for life and that can have a direct impact on their career, health and societal choices.

In 2021, the [Canada Foundation for Innovation \(CFI\)](#), in partnership with [Acfas](#), worked with polling firm, Ipsos, to conduct a survey of 18- to 24-year-olds in Canada. The goal was to learn how this group forms their attitudes toward science and to understand the conditions and people who shape those attitudes, with specific reference to topics including COVID-19, plastics pollution, climate change and government science policy.

The CFI and Acfas were motivated by their shared commitment to supporting science education and literacy among Canada's youth. Ensuring the next generation has a positive view of scientific research is vital to the future of science, innovation and prosperity in Canada.

The results showed that of the 1,500 young adults surveyed, most have confidence in science, but that persuasion by social media influencers and difficulties delineating between real and fake information can affect their ability to make informed health, environmental, social and lifestyle choices.

As a follow-up to these findings, in June 2022, the CFI and Acfas invited stakeholders from across the country to reflect on what next steps could be taken with respect to three priorities:

- The role of educators in promoting science literacy
- The current state of science communication to build public trust
- The skills in science and technology that will contribute to the Canadian economy.

This report summarizes that virtual event.

Setting the stage for a national conversation

Opening remarks from the CFI, Acfas and the Government of Canada

The event opened with brief statements from CFI President and CEO Roseann O'Reilly Runte and Acfas Executive Director Sophie Montreuil. Mentioning that 2022 marks the CFI's 25th anniversary, Runte explained, "We thought that we would look, not just back at what we've done, but ahead, at what the next generation will do and will need to do, and the challenges they face."

Montreuil added that her own organization will celebrate its centenary in 2023, which likewise makes for an appropriate time to look ahead and assess the attitudes of young people to science.

The Honourable François-Philippe Champagne, the federal Minister of Innovation, Science and Industry, then welcomed attendees and highlighted the Government of Canada's commitment to supporting science and research.

Summary of survey findings from Ipsos Canada

Sebastien Dallaire, Senior Vice-President of Ipsos Canada, then provided an overview of the findings from the survey. Highlights included:

- Almost three-quarters of survey respondents were daily users of social media platforms, especially Instagram and YouTube, and more than half of this group spent at least four hours a day engaged in this way.
- Respondents represented a spectrum of opinions from those who are most likely to support science and feel comfortable discussing scientific topics with friends and family, even to the point of defending the value of science in public policy or considering a career in some branch of STEM, to those who will be less likely to support science or be familiar with many scientific topics, which would seldom be discussed in their social circles.
- Individuals at either end of the spectrum are likely to surround themselves with like-minded people. This implies that whether they are enthusiastically supportive or against particular scientific perspectives, they may not be as willing to consider opposing views.

[Read more about the results of the survey](#)

Plenary discussion: the impacts of science misinformation

Eric Meslin, President and CEO of the Council of Canadian Academies (CCA), joined Dallaire and Runte for a broader review of the survey findings. He began by emphasizing that the use of the term “science” should not convey the plans of a monolithic enterprise, since there is in fact a huge variety of activities that fall under some aspect of being “science.” He likewise made what he regarded as a crucial distinction among terms such as data, evidence, information, knowledge and truth, all of which have varying shades of meaning with respect to science communication.

“These all get blurred together in the minds of those who are either answering questions or who are being asked to develop policy,” said Meslin. “I daresay that if [the survey] asked people how confident they were in high-level data analyses, or relying on them, they would give different answers from the ones that were given. This is not a critique of the survey, but shows the additional work we have to do.”

Meslin added that he appreciated the focus on youth, which contrasts with the broader cohort of Canadian society CCA is surveying for its own study examining the real-life impacts of science and health misinformation.

“What this study did was unpack a huge and obvious point,” he said, referring to the dominance of social media in lives of these young participants. “They are a very different community. And secondly, this group was raised on the Internet, was born with a tablet in their hand. There has been a fundamental and disruptive — for the better — movement. Youth in Canada and elsewhere have reminded us about the way they consume, seek out, curate, manage, make sense of, and then utilize the various forms of data, information, evidence, or knowledge. It’s quite a messy environment.”

Meslin concluded with two takeaways:

- He cautioned against letting these results perish in the “valley of death” that confronts such initiatives on the way to policymakers. “This is where the conversation starts, not ends,” he insisted.
- He reflected on what the survey tells us about the career prospects and ambitions of this generation. The traditional academic system, which encourages individuals to pursue a PhD and become academic instructors just like the PhD-holders that taught them, is under serious strain, with fewer resources and fewer opportunities. There is now a need to find meaningful new paths for those with PhDs to contribute to Canada and fulfill their own aspirations.

During the question period, Dallaire was asked what study should be done after the CFI/Acfas study. He suggested that future work should explore each of the identified survey segments in more detail, which would include examining the many different dimensions of the meaning of “science” to respondents. When asked about his primary takeaway from the survey, Meslin voiced his curiosity about where members of the various segments would go in the future, and how their attitudes might change over time. He proposed a longitudinal study that would follow these individuals in the years ahead, to document these developments.

Breakout sessions: Examining three priorities in detail

After the plenary, participants split into three breakout sessions that focused on the three priority areas: literacy and scientific culture; scientific communication and public trust; and science and technology skills.

Literacy and scientific culture: What is the role for educators?

Moderator: **Frédéric Bouchard**, Dean of Arts and Science, Université de Montréal

Panelists: **John Munro**, President, British Columbia Science Teachers’ Association

Bonnie Schmidt, President, Let’s Talk Science

This session considered the challenge of teaching science as a process, rather than a fully defined set of facts. That distinction is crucial to helping students understand that scientists are often working with incomplete knowledge on any given subject, so that any conclusion they draw could change as research proceeds. In practical terms, therefore, this approach would call for teachers to move away from scientific exercises with predictable outcomes. If students engage in open-ended activities that could have a number of distinct end points, it will give them a direct experience of the interpretation that is necessary to arrive at a scientific conclusion.

In a broader administrative context, panelists noted that Canada is the only developed country without a national ministry of education. The result has been a very complicated educational network at all levels, which can vary widely from one jurisdiction to another. Canadians nevertheless assign high expectations to teachers, who may find their efforts hemmed in by the complexity of the system in which they operate. As seen in the United States, educational objectives can be compromised and distorted by politics. While this is less of a problem in Canada, there remains a risk that educators will not be regarded as worthy of public trust, which would limit their ability to establish in young people trust in the work of science and scientists.

By the same token, science is essentially built on critical thinking and skepticism, so these skills should also be cultivated in the same population of students. It will also lay the foundation for a generation that will go on to use science for the improvement of society. As Munro put it:

“We want them to think about what really matters. Science can be a pathway to fixing real things. I don’t want it to stop at plants and caterpillars.”

Scientific communication and public trust: Do we need to revisit our approaches?

Moderator: **Carly Weeks**, Health Reporter, *The Globe and Mail*

Panelists: **Chantal Barriault**, Director, Science Communication Graduate Program, Laurentian University

Sandy Baumgartner, CEO, Saskatchewan Science Centre and President, Canadian Association of Science Centres

Anna Blakney, Assistant Professor, Michael Smith Laboratories and School of Biomedical Engineering, University of British Columbia

Just as the session on literacy began with the need for educators to help students appreciate the nature of the scientific process, rather than just scientific findings, this session also began with a call for science communication with the public to emphasize process. Barriault said that one scientist described this process as being similar to changing a tire on a moving car — a good image for sharing the complexity of science with a lay audience.

She added topics such as climate change and the COVID-19 pandemic have confirmed such audiences do not respond to facts alone. It is insufficient to simply share as much information as possible in the hope that this will convince people of the value of a given observation or conclusion. Instead, it is essential to engage audiences, to conduct a dialogue with them, if possible, in order to win their empathy for the challenging task faced by science.

With respect to the findings of the survey, specifically the dominance of social media as the preferred communication platform of young Canadians, Blakney indicated that it can be daunting for members of the scientific community, like her, to consider reaching out in this way. The results can easily come across as amateurish, which may be unacceptable to a scientist, but these qualities actually convey an important sense of vulnerability and authenticity that can win over younger audiences.

In a related fashion, it can be more effective to allow those audiences to assess dissenting perspectives for themselves. Directly attacking an opponent, such as an anti-vaxxer, can be counterproductive and may simply lead people to harden their positions. However, providing specific academic references to counter misinformation will respect the ability of individuals to make up their own minds.

Science and technology skills: What do young adults need to contribute to a strong Canadian economy?

Moderator: **Valerie Walker**, CEO, Business + Higher Education Roundtable

Panelists: **Duff Montgomerie**, former Deputy Minister, Labour and Advanced Education, Nova Scotia

Nancy Déziel, Director General, Centre national en électrochimie et en technologies environnementales (CNETE)

Nadine Spencer, CEO, Brand EQ Group Inc., Black Business and Professional Association

As opposed to setting forth a set of specific technical skills that young Canadians should acquire, this session focused on the necessary environment for those skills to be conveyed. Panelists offered mentorship as the most important need, as it ensures that young people become integrated into a working environment in a much more comprehensive way than merely “training.” Educational institutions, for their part, will be much better placed to foster such relationships if they build strong collaborations with the business community where students might eventually be expected to work.

Spencer noted that while enrolment in STEM programs grew significantly after 2018, only a fraction of these graduates worked in a field related to STEM. For her, this observation raises questions about whether there is a disconnect between available jobs and the opportunities being presented to young people, who may not see themselves — their gender, their ethnic origin, or their culture — represented in a STEM-based enterprise. If these enterprises genuinely want to welcome these potential recruits to their ranks, they must become part of shared stories about science and its role in Canadian society — stories that will appeal not only to youth, but also to business and government leaders who will provide the resources to outfit young people with the skills they need.

Summing up

Researching misinformation

Timothy Caulfield, a professor in the Health Law Institute at the University of Alberta, spoke with CFI’s Runte on the challenges of communicating the sciences, including the ways in which scientific language or concepts are appropriated — often incorrectly — for political or commercial ends. He insisted that we should not be surprised at such appropriation.

“Misinformation has been around for as long as humans have been communicating,” he said.

In contrast to earlier eras of human history, however, the most recent generation of electronic communication has profoundly increased the sheer volume of misinformation.

“Misinformation is killing people,” he said, referring to an American health authority who maintained that misinformation was actually eroding life expectancy in the United States. “It is having an incredibly adverse impact on public discourse and our democracy.”

This is not entirely the fault of social media, which Caulfield acknowledged can be a positive force in community-building. But these same platforms can be used to reinforce biases we may have, or even establish entirely new biases that run counter to many scientific arguments. The result is a vast assortment of “echo chambers” online, such as discussion groups that cater to a narrow range of opinions, within which information will be presented selectively.

Caulfield pointed to research and dedicated efforts to confront problems caused by the most toxic of these settings. He especially emphasized the role of critical thinking, a skill that must be taught to individuals as part of a dedicated educational initiative. “There are some jurisdictions, Scandinavian countries, that do this very early, as early as kindergarten,” he said. “This is not, as I’m sure critics will say, ideologically motivated. This is teaching neutral thinking skills that can be deployed throughout a lifetime, and that is becoming so essential in our current information environment.”

Conclusions — and a “clarion call” for action

The moderators for the breakouts offered their takeaways from their respective sessions. Walker, who moderated the session on science and technology skills, said, “no matter what those skills end up being, we are moving increasingly, in order to be successful, to a model where educators and employers and governments need to work collaboratively. And collaboration is hard work.”

Runte picked up on that theme to ask that if social media is such a dominant force, should it be embraced by organizations like the CFI or Acfas, which want to reach young people? Walker responded that more is required. “Technology provides a very powerful platform, but technology without people, or without connection to people, that is not true connection. I’m still thinking about how we adapt and adopt the technology that we have available.”

Bouchard cautioned against what he dubbed the “naïve” use of communications technology, which can isolate people rather than bringing them together.

“These tools don’t, by themselves, foster community,” he said. “We all have to be much more determined to increase the shared trust and good will across differences.”

Weeks added that there is a vulnerability and authenticity associated with the use of social media.

“You need to be adaptive and innovative and not afraid to make mistakes. We are used to creating reports that have to be seen by multiple eyes for approval and these things can take a long time. Meanwhile, your local anti-vaxxer puts something out that can make its way around the world instantly. The approach has to change and adapt to the rapid nature of communication and the public desire for that level of engagement.”

Runte commented on the inspiring, optimistic array of ideas that came out during the discussions. “It’s not just education, it’s not just communication, technology, or the economy. It’s all of these fields together. And together we can make a difference that will take us not away from innocence, but away from ignorance, to a kind of wisdom that will enable us to use human capacity for the greater good.”

While participants were divided into three separate sessions to discuss specific aspects of the survey's implications, it was clear that these topics could not be "siloes" or isolated from one another. The content within each discussion overlapped significantly with the others, helping to provide some future direction for stakeholders from various sectors on science education and communication policies directed at young people.

Montreuil suggested that it is up to individuals and organizations in these sectors to make a concerted effort to focus on young people, and try to engage them where they are.

Runte specifically referred to the survey as nothing less than a "clarion call" for collaboration among various public and private-sector partners with an interest in reaching these audiences. More specifically, the discussion yielded these calls for action:

On science literacy and education:

- Adapt curricula to include "open-ended" activities, such as experiments that do not have predictable outcomes, which force teachers and students to engage in the challenging task of interpreting less-than-perfect results.
- Present science as a way of actively engaging with the world — solving practical problems in our day-to-day lives — as opposed to a more academic pursuit limited to observing what is happening around us.
- Interested parties in the public and private sector should ally with teachers, rather than off-loading high expectations on these individuals and expecting them to act alone.

On science communication:

- On controversial matters such as climate change, reach out to audiences in ways that promote empathy and dialogue, rather than simply throwing more information at them to defend a particular perspective.
- Members of the scientific community should not be afraid of appearing vulnerable, perhaps by acknowledging the limits of their understanding of complex topics, as a way of building trust with audiences.
- Look beyond the narrow cultural lens promoted by Western, English-language media, to consider a wider array of viewpoints.

On science and technology skills:

- Experiential learning is essential, both for individuals seeking to acquire new skills as well as organizations that want to integrate the contributions of those individuals.
- Make STEM attractive as a fully fledged career path, not just as an educational ambition.
- Highlight diversity within STEM as a way of encouraging individuals from diverse backgrounds to enter these fields.