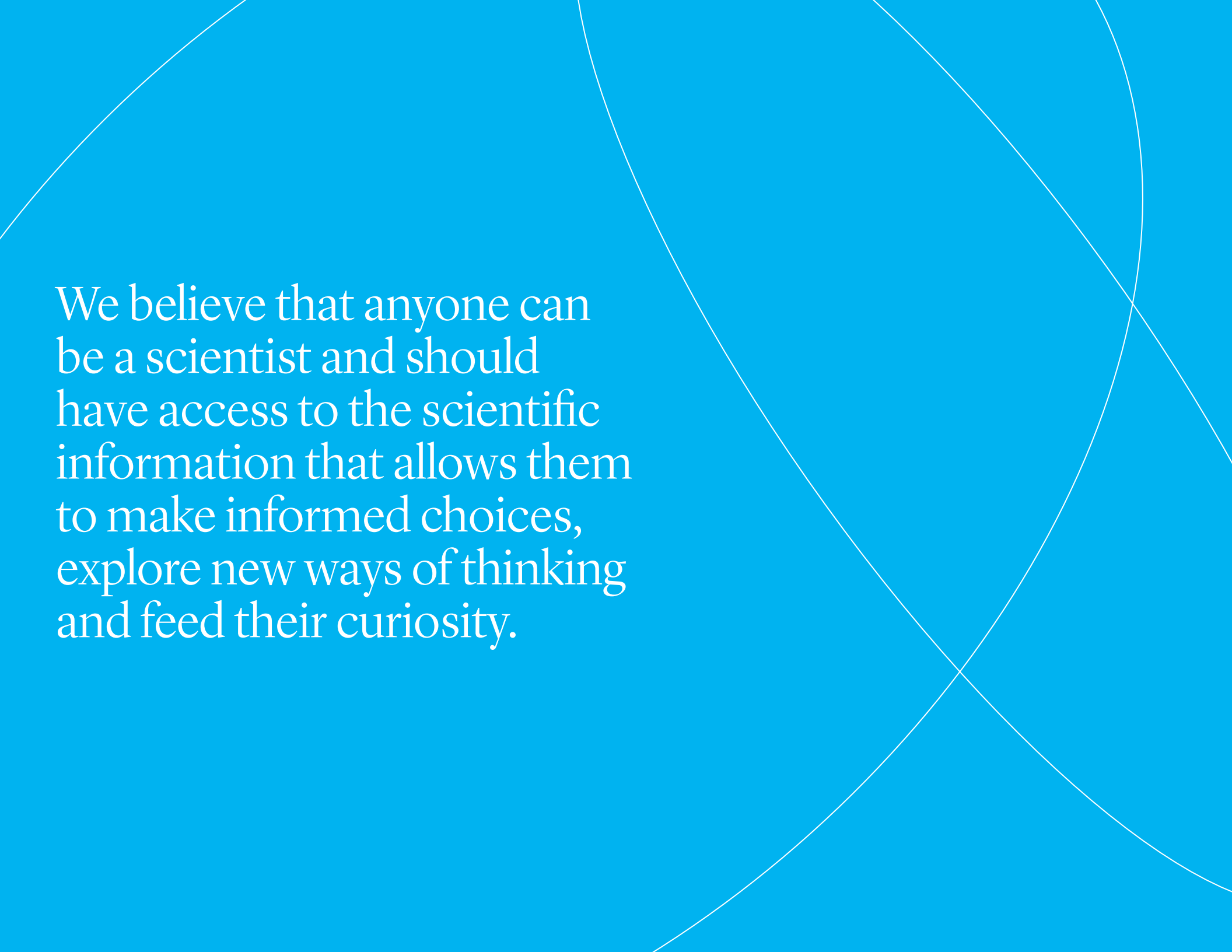


SciXchange: The First Three Years



We believe that anyone can be a scientist and should have access to the scientific information that allows them to make informed choices, explore new ways of thinking and feed their curiosity.

Director's message



As I reflect upon our first three years at SciXchange, I am so proud of how much we have grown and the range of people we have reached. We have always aimed to make science engaging, accessible and comprehensible to a wide audience. When we launched in 2017, our vision was to become a leader in increasing science literacy and engagement. I am pleased to see that we are off to an amazing start!

As the Director of SciXchange, I am continually inspired by the hard work of our core team, consisting of Leigh Paulseth, our Enrichment and Outreach Co-ordinator, Amber Sandy, our Co-ordinator of Indigenous Knowledge and Science Outreach, and Stephanie Sim, our Departmental Assistant. Together, we hire students and provide them with enriching experiential learning opportunities to develop their skills in science communication. We also work with various volunteers and community partners, creating a hub for connections in science outreach.

We live in a challenging world. Now more than ever, we need the innovative solutions that come from the application of science. These current pandemic times reveal the importance of clear science communication. Members of the scientific community must share their knowledge and welcome questions. Conversation is key and SciXchange plays an important role in providing platforms for this dialogue.

I hope that you enjoy reading some highlights of the many programs and events from these early years of SciXchange. I invite you to join us in celebration of all that we have accomplished as we look forward to building our team, expanding our partnerships and further engaging communities locally, nationally and globally.

Emily Agard, PhD
Director, SciXchange

Introduction



Community engagement has always been important to the Faculty of Science. Although SciXchange was officially launched in 2017, science outreach programs at Ryerson University have been engaging community members since the Faculty of Science was established in 2012. Students, faculty and staff have all contributed to making outreach a key priority and in supporting efforts to include the broader community in science exploration.

Above: Dr. Lynda McCarthy, a professor in the Department of Chemistry and Biology, answers questions about her research during Soapbox Science.

Students, faculty and staff have all contributed to making outreach a key priority and in supporting efforts to include the broader community in science exploration.

The past three years have been a tremendous time of growth for SciXchange. As we have built our core team, we have been able to engage communities we would not otherwise have been able to reach. Community involvement is fundamental to the success of SciXchange and we cannot do our work alone. Our office has employed 20 undergraduate and graduate students over three years and has provided hundreds of volunteer and

leadership opportunities to students within and beyond the Faculty of Science. We have also fostered partnerships and relationships with organizations, institutions and communities to ensure our programs are accessible to a wide range of people.

From the beginning, SciXchange's work has always been guided by equity, diversity and inclusion. Our goal is to increase science literacy by making science engaging and accessible for the general public. This means encouraging diverse voices to enter science fields, as well as awakening the inner scientist in every person, regardless of science background, age or socio-economic status. We work with educators, community leaders and an array of organizations to ensure that we bring a love for science to a broad audience. SciXchange built on successful outreach initiatives dating back to 2008. Ryerson participated in the first Science Rendezvous event in Toronto and welcomed high school students to campus to engage in science labs.

In 2016, the Faculty of Science commissioned market research on the outreach industries related to the fields of science, technology, engineering and math (STEM). This research informed the creation of SciXchange and a summary can be found in our strategic plan (2017-2019). Together with the priorities and values set out in Ryerson's academic plan (2014-2019), SciXchange built its own mission, principles and vision. This review will outline how we have supported each of our principles over the past three years and have strived to realize our vision of a scientifically engaged society.

As we celebrate our successes from the first three years, we must acknowledge the tremendous work and contributions of our staff, volunteers and supporters. Our successes have not come without challenges and we will continue to adapt our work, create new and innovative programs and support our allies in this realm in order to achieve our mission and to create better science engagement opportunities.



SciXchange's work has always been guided by equity, diversity and inclusion. Our goal is to increase science literacy by making science engaging and accessible for the general public.

Left: A young attendee builds a simple robot with a volunteer at the Alumni Family STEM Day.



Principles

- dedication to increase science literacy
- commitment to community engagement
- fostering of local, national and international collaborations
- provision of experiential learning opportunities for students
- promotion and support of faculty in science communication and outreach



Mission

Our mission is to make science engaging, comprehensible and accessible to the general public. We aim to increase science literacy and foster critical thinking about scientific issues. We provide opportunities for members of the community to engage in science through hands-on work and discussion. We support scientists in effectively communicating about their research. We offer students new opportunities for experiential learning through science outreach. We are guided by principles of diversity and inclusivity in every aspect of our work.



Vision

SciXchange will be a national centre to promote science communication and outreach. We will be associated with science research and communication that is grounded in the public interest. Through local, national and international collaborations, we will be a global leader in making science accessible and inclusive, increasing science literacy and engagement worldwide.



A group of youth attendees at the Alumni Family STEM Day work together on an experiment.

Highlights

In 2017, SciXchange made a commitment to becoming a leader in science communication. Since then, we have celebrated numerous milestones that have always been guided by our founding principles. Each program, partnership and award brings us another step closer to fulfilling our vision.



March 2017
Launched the newly branded SciXchange.

June 2017
Won the Fabulous Favourite Award in the #DisplayYourPride decorating contest!

September 2017
Began visiting elementary schools and inviting high school students to campus to deliver hands-on science activities.

Hosted our second annual Science Literacy Week on campus.

January 2018
Hosted the Let's Talk Science regional conference for Ontario.

May 2017
Began hosting the annual High School Symposium, a full day of science learning for local students.

Hosted the first Soapbox Science event in North America during the annual Science Rendezvous festival at Yonge-Dundas Square.

August 2017
Launched the first Camp SoSci and the Harriet Brooks Internship to offer free programming to youth in underserved/low-income communities.

Began hosting the STEM Community Leaders group from the Visions of Science Network for Learning for several days each summer.

December 2017
Hosted our second Coding & Cocktails event for Hour of Code, a global celebration of computer science.

February 2018
Facilitated a science fair at Taylor Creek Public School.



May 2018
Celebrated the 10th anniversary of Science Rendezvous in Canada and at Ryerson!

September 2018
Collaborated with Women in Computer Science to engage female high school students in the ambassador program.

Became a partner in Technovation Girls Toronto.



May 2019
Hosted Science Rendezvous in the Kerr Hall Quad!

July 2019
Launched the Stoodis Science program to engage Indigenous communities in Indigenous and Western science activities.



September 2019
Hosted the first deer hide tanning program during Science Literacy Week.

February 2020
Hosted the first ever SciCommTO Conference at Ryerson University.

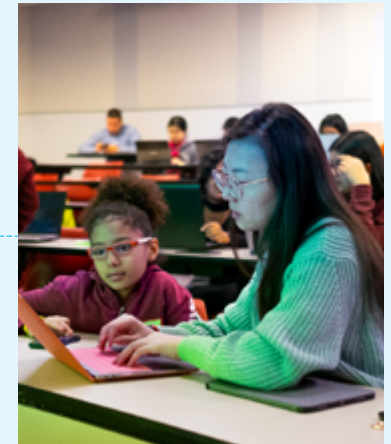
July 2018
Sponsored youth to participate in the Student Program for Innovation in Science and Engineering (SPISE) in Barbados.

October 2018
Began partnership with the Royal Canadian Institute for Science to co-facilitate meetings of the SciCommTO network.

June 2019
Won the Most Environmentally Sustainable Award in the #DisplayYourPride decorating contest!

August 2019
Launched the computer literacy initiative to bring hands-on digital activities to schools and community partners.

January 2020
Partnered with Shopify to become official hosts of Technovation Girls Toronto.



Dedication to increase science literacy

Science literacy serves as the foundation of all SciXchange programs. We believe that anyone can be a scientist and should have access to the scientific information that allows them to make informed choices, explore new ways of thinking and feed their curiosity. For that reason, we partner with individuals and organizations across fields of science to support science outreach initiatives and to deliver content in new and creative ways.

SciXchange is a founding member of SciCommTO, a network in the Greater Toronto Area (GTA) that consists of individuals who are passionate about communicating science to a wide and diverse audience. In 2018, SciXchange partnered with the Royal Canadian Institute for Science to co-ordinate SciCommTO. This partnership allowed us to expand our network of professional communicators and aspiring science professionals and to support growth in this community. In February 2020, we built on this partnership by presenting the SciCommTO Conference. The first event of its kind in Toronto, the conference brought together science communication professionals and enthusiasts from across Toronto and beyond.

Science includes a broad spectrum of subjects and disciplines and SciXchange is committed to supporting and promoting a breadth of topics within STEM. Indeed, we partner with researchers, students, groups and organizations to develop programs that represent a wide range of STEM studies.

We partner with individuals and organizations across fields of science to support science outreach initiatives and to deliver content in new and creative ways.



Right: Conference attendees write down their answer to a science communication question on an interactive idea board.

For example, through our partnership with Ryerson's Faculty of Engineering and Architectural Science, we offer Camp Eureka!, a fun summer program that features engaging science and engineering activities. Additionally, our summer programs for high school students always include guest appearances by industry and academic professionals (from Ryerson and other institutions), who represent a cross-section of fields, such as medical physics, nutritional science and information technology.

This work helps to build a stronger and more scientifically literate society and helps to forge partnerships across STEM industries, academic institutions and organizations. Together, we are building a science community that can discuss information with the general public and can foster interest in, and support for, Canadian scientific research.



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Left: Science communication professionals networking during the 2020 SciCommTO Conference.

Commitment to community engagement

Below: A Soapbox Science volunteer teaches Science Rendezvous attendees about DNA in Yonge-Dundas Square.



In 2017, SciXchange committed to building communities by connecting them through science. We recognized the importance of not only learning about science, but also connecting individuals with a common interest in learning together. To that end, SciXchange developed a collection of programs that enabled individuals of all ages and backgrounds to get involved in science.

SciXchange organizes the Toronto events for Soapbox Science, an international public outreach initiative that promotes the work of women scientists. We take part in national outreach events including Science Literacy Week, which highlights the importance of Canadian science, and Science Rendezvous, an annual celebration of science. Featuring more than 40 event hosts across Canada, the one-day event takes science out of the lab and into local communities. Science Rendezvous has brought thousands of parents, children, students and their friends to Ryerson to learn about all kinds of scientific concepts and ideas. Along the way, we have seen residents of Toronto join together to increase their knowledge and to learn from each other.

In addition to these large events that have broad appeal, we have developed and facilitated programs for youth. Hands-on activities provide opportunities for youth to approach science in a different way and engage with scientists in their community or at Ryerson. Throughout the last few years, we have explored how we can develop stronger, more meaningful relationships with the youth we serve. To that end, we have trained our staff and volunteers to take on leadership roles and to become mentors in their communities. Our staff and volunteers have also visited partner schools and community centres to facilitate monthly activities and weeklong immersive programs. We are excited that these programs have broadened our reach in the community, increased the number of hours we spend with each youth group and deepened our understanding of the community's needs.

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Above: A Camp Eureka! Instructor teaches a youth participant about the human digestive system.

Three Year Data: Community Engagement

17 communities 


Total communities and cities visited* (2017-2019)

711.5 hours 

Total hours of programming* (2017-2019)

8,137 

Total number of youth engaged* (2017-2019)

9,925 

Total members of the public engaged* (2017-2019)

*Data is provided from SciXchange's yearly statistical reports.

In 2019, SciXchange extended its reach to Indigenous communities. We recognize the unique and diverse cultures of Indigenous communities, as well as the contributions that Indigenous Peoples have made to science throughout history. Therefore, it became a priority to build meaningful and reciprocal relationships with these communities in order to amplify their existing STEM work and to learn how to respectfully share Indigenous science. To do this, we launched Stoodis Science, a program aimed at creating learning opportunities for Indigenous youth. In this program, participants have learned about Indigenous and Western forms of science and how they have impacted each other. We are fortunate to have been welcomed into Indigenous communities, where we will continue to build important and long-lasting connections.

Below: Amber Sandy (left), SciXchange's Co-ordinator of Indigenous Knowledge and Science Outreach, lends a hand at the deer hide tanning station that was displayed during the 2019 Ryerson Powwow. Sandy says the university can uphold its commitment to the Truth and Reconciliation Commission's recommendations by creating space on campus for Indigenous knowledge and community building. Photo: Kaytee Dalton.



Fostering of local, national and international collaborations

Collaboration is at the heart of what SciXchange does. We have partnered with schools, communities and organizations in Toronto and around the world to achieve our mission of increasing science literacy and supporting diverse communities in science.

At the local level, we are fortunate to be located in the diverse and growing city of Toronto. We have collaborated with school boards, community centres and non-governmental organizations within the GTA to make our programs accessible to youth and the general public. We have connected with fellow practitioners through networks, such as SciCommTO, and our partnerships with businesses and industries have extended our reach and enabled us to provide resources to communities that need them.

Three Year Data: School Engagement

98 schools 

Total number of schools engaged* (2017-2019)

*Data is provided from SciXchange's yearly statistical reports.

Right: High school students showcase a windmill they developed during the Student Program for Innovation in Science and Engineering (SPISE). SciXchange has sponsored several participants in the program, which is offered by the Caribbean Science Foundation.



We have partnered with schools, communities and organizations in Toronto and around the world to achieve our mission of increasing science literacy and supporting diverse communities in science.

SciXchange has also contributed to national initiatives by participating in Science Rendezvous and Science Literacy Week, both of which are celebrated across Canada. We were early participants in each of these initiatives and also continue to partake in Science Odyssey, a national campaign that celebrates Canadian achievements in science, technology, engineering, arts and mathematics. What's more, we have been an official outreach site of Let's Talk Science since 2014, contributing to their national STEM education programs and activities for youth.

On the international level, SciXchange has participated in a number of global initiatives, such as Soapbox Science. In fact, we were the first group to bring Soapbox Science to North America and we continue to support and advocate for its adoption across Canada. Finally, SciXchange is a member of the Caribbean Diaspora for Science, Technology and Innovation (CADSTI). Through CADSTI, we have sponsored several participants in the Student Program for Innovation, Science and Engineering (SPISE). Developed for high school students across the Caribbean, SPISE is held each year in Barbados.



On the international level, SciXchange has participated in a number of global initiatives, such as Soapbox Science.

Left: Planetary scientist Dr. Sara Mazrouei, an educational developer in Ryerson's Centre for Excellence in Learning and Teaching, discusses the moon with a young Soapbox Science attendee.

Provision of experiential learning opportunities for students


Science learning requires a great deal of trial and error. At SciXchange, we provide opportunities for individuals to apply this process of learning to other skills and interests. We started by partnering with Let's Talk Science to deliver exciting science experiments to elementary and high school students in their classrooms or on Ryerson's campus. During the past three years, we have engaged with more than 8,000 students, who have learned about science by building models and using industry-grade lab equipment. We have also hosted the annual High School Symposium, a full day of science learning that enables high school students to network with professors, learn about the research of master's and PhD students and work together on problem-solving activities.

In order to execute these programs and several others, we rely on volunteers from the Ryerson student community. Our goal: to enable Ryerson students to test out different roles in science and to


build the leadership skills that will inspire young people's curiosity. We have aimed to create a diverse arrangement of roles so volunteers can experience all aspects of the STEM sector, and try something new (or continue building something they already know) to experience the successes and mistakes that will contribute to their growth.

For example, we have provided our volunteers with opportunities to plan events, create social media campaigns, teach youth, engage with members of the public and network with professors. In the last three years, we have worked with more than 500 volunteers, who have helped us grow our initiatives while nurturing their passion for all facets of science.

Three Year Data: Volunteers

521 

Total number of volunteers* (2017-2019)

4,325 

Total number of volunteer hours* (2017-2019)

*Data is provided from SciXchange's yearly statistical reports.

Promotion and support of faculty in science communication and outreach



SciXchange's programs would not be successful without the support and participation of Ryerson faculty and staff. Through this reciprocal relationship, we have been able to build opportunities for Ryerson community members to engage with youth and the general public.

Public events organized by SciXchange provide exciting opportunities to celebrate the expertise within the Faculty of Science and across the university. Annual events like Science Rendezvous not only connect the public with the Faculty of Science, but also foster collaboration among the faculty's members. Each year, dozens of faculty and staff create original activities to share their research and expertise with visitors. Our annual Soapbox Science event also provides opportunities for Ryerson faculty members, PhD students and postdoctoral fellows to share their research with hundreds of families while also meeting GTA-based lead researchers from other fields.

Beyond one-day events that engage thousands of people, we have partnered with Ryerson researchers to dive deeper into their science communication endeavours. Whether those initiatives include presenting to a group of high school students or creating a hands-on activity for classrooms, Ryerson faculty and staff have provided immeasurable help in developing and delivering our science outreach programs.

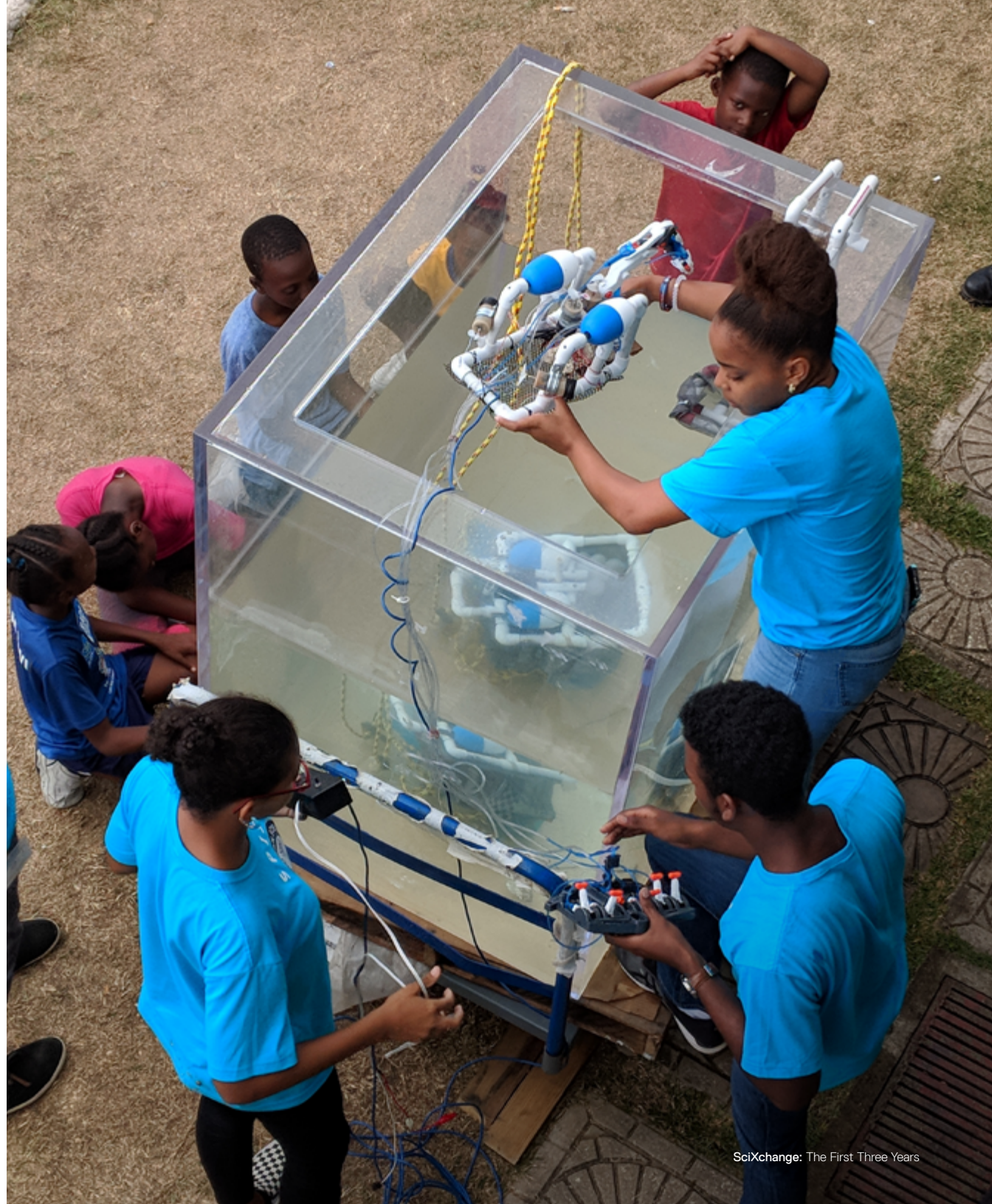
Left: Panellists at the 2020 SciCommTO Conference discuss how to succeed as a science communication professional.

Appendix

Our partners and collaborators

- Caribbean Diaspora for Science, Technology and Innovation (CADSTI)
- Caribbean Science Foundation
- Canadian Cancer Society
- Faculty of Engineering and Architectural Science, Ryerson University
- Faculty of Science, Ryerson University
- Let's Talk Science
- Ryerson Summer Day Camps, Ryerson Athletics & Recreation
- Natural Sciences and Engineering Research Council of Canada's PromoScience Program
- Nutrition and Exercise Testing Lab, Ryerson University
- Ontario Alliance of Black School Educators (ONABSE)
- Royal Canadian Institute for Science (RCIScience)
- SciCommTO
- Science Discovery Zone, Ryerson University
- Science Literacy Week
- Science Odyssey
- Science Rendezvous
- Shopify
- Soapbox Science
- Technovation Girls
- Visions of Science

Right: SPISE participants display a water project they developed during their intensive program.



Together, we are building a science community that can discuss information with the general public and can foster interest in, and support for, Canadian scientific research.

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