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51 LOOKING AHEAD...
Established in 2009 with a leadership gift from Imperial Oil, the Queen’s Faculty of Education Community Outreach Centre (QCOC) has established itself as an important hub for innovative programs and projects related to literacy, and science, technology, engineering and mathematics (S.T.E.M.) education in southeastern Ontario. Currently, all QCOC programs are collaborations based in or with schools, museums, community organizations, Arts academies, and post-secondary institutions (Queen's, The Royal Military College of Canada and St. Lawrence College) with support from educators, S.T.E.M. professionals and expert volunteers from the greater Kingston community.

To define the mandate for the QCOC and set a meaningful agenda for its activities, it was necessary, first, in 2009-2010, to conduct a small study of “outreach” at the institution and in the community. The goal of the study was to gather data to complete a gap analysis in order to identify a unique niche for the QCOC and articulate a direction for its undertakings that did not overlap, duplicate, impede or negate the work of others whose mission also was “outreach.”

Data was gathered through conversations with faculty, local educators, school district administrators, post-secondary undergraduate and graduate students, parent council representatives and community members; departmental literature and on-line descriptions of “outreach” projects.

Data collection showed that there were more than 100 “outreach” projects at Queen’s and hundreds more within the community. At the institutional level, there were many “outreach” programs organized by students. Some were individual initiatives, others were coordinated by student societies, and others by national organizations (e.g., Let’s Talk Science). Others were supervised by faculty members, departments or schools, and supported by staff, faculty and students.

At the community level, the same variation existed. Some “outreach” programs were the product of one or two individuals while others were supported financially and in-kind by international (e.g., Girl Guides), national (The SNAP Mathematics Foundation), provincial (FED DEV Ontario) and local (Quinte St. Lawrence Mathematics Association, QSLMA) organizations.

At the institutional and community level, several important patterns emerged. First, most “outreach” programs were short-duration, special program foci implementations (e.g., Go Eng Girl! Day, the Queen's Centre for Neuroscience Brain Bee Competition). Second, many “outreach” programs were summer day camps or school break enrichment camps—the former directed at elementary school students’ specific interests (e.g., environmental studies, athletics or art) and the latter aimed at supporting and recruiting “the brightest and the best” secondary school students for future enrolment at Queen’s. Lastly, in only a very few cases, “outreach” was actualized through sustained mentorship programs (high school robotics leagues [Faculty of Applied Science and Engineering] and after-school S.T.E.M. clubs [Professor Emeritus Henk Wevers at The Boys and Girls Club] or on-going buddy partnerships (Queen’s Alma Mater Society Kaleidoscope). In general, there were many more literacy, social skills, arts and athletics “outreach” programs than S.T.E.M. initiatives.

While the institutions or community organizations conducted little or no formal evaluation of the efficacy of the various “outreach” programs beyond exit surveys or participant satisfaction questionnaires for internal
use only, the end-users described inconsistent quality with respect to curriculum alignment, instruction, age-appropriateness of content, program delivery, contact information, and collaboration. While end-users appreciated the good will and intent of “outreach” personnel, they were frustrated by difficulties in communication; rotational leadership; unreliable logistics; inconsistent coordination; inexperienced volunteers; and, lack of attention to details around issues of safety, equity and special needs.

The data underscored the fact that there is no commonly held definition of “outreach.” For some groups, “outreach” was the act of providing services to populations who might not otherwise have access to those services (e.g., tutoring). For others, it meant becoming involved in a community or effort (e.g., the annual Fix and Clean event). Some “outreach” volunteers believed that they were filling a gap in the services provided by mainstream systems, organizations or agencies (e.g., The Breakfast Club). Regardless of their definition, all “outreach” groups and individuals believed that they were contributing to the personal growth, development, and education of the participants in their projects.

These findings were consistent with the literature related to “outreach” which states that the phrases “outreach” and “community engagement” have a multiplicity of meanings and can vary greatly depending on the institution, discipline and individual (Watermeyer, 2011). Similarly, the examples of “outreach” or “community engagement” that were identified are consistent with images of traditional, hierarchical models in which experts disseminate knowledge to the public (e.g., public seminars, university open houses, and performances and workshops in schools) (Watermeyer, 2011).

The literature also confirmed what we noted as a reluctance to participate in “outreach” on the part of some faculty and graduate students: the perceived norm by academics is that participation in public outreach is not recognized and rewarded by universities, which in turn, suggests that there will be negative repercussions for academic career advancement which requires “legitimate” research and teaching (Andrews et al. 2005; Moskal & Skokan 2011; Nicotera et al. 2011). University faculty have many roles to play and many professors believe that any outreach obligations detract from their teaching, research and publishing responsibilities.

Given the broad spectrum of “outreach” projects, definitions and intended outcomes, and community and faculty perceptions, it was clear from the outset that the QCOC faced an enormous challenge as it was formally launched into the institutional and community “outreach” collective in the greater Kingston Community.

We used data from our own needs assessment and from the literature to guide our direction and activities, based on principles of collaboration, capacity-building and research, and our own broad interpretation of students “at risk.” We believed that students could be at risk because of the challenges of low SES, but they could also be at risk because there were no accessible opportunities for curriculum enrichment; students could be at risk because parents (or other caregivers) were unable to support learning at home because of changes to the curriculum or because achievement was impeded by adult role models’ negative attitudes or dispositions; students could be at risk because their teachers were anxious about specific subject content and instruction; or students could be at risk because of deleterious societal perceptions. All of these are believed to be factors in S.T.E.M. education.

This led to the QCOC’s predominantly S.T.E.M. focus on informal education, mentoring, parent and public education and research partnerships.1

SELF-STUDY: EXAMINING THE QCOC INITIATIVES

After four years of programming at the QCOC, and three, two-year studies about our major initiatives, we are able to present some of the findings of the impact about our informal education/mentoring activities, research partnerships and public education events.

1A full description of the activities of the QCOC can be found at http://educ.queensu.ca/community/outreachcentre.html
An improvement-oriented evaluation model framed all three studies (Springer, 2010). Purposive and convenience sampling were used to achieve variation in the data (Creswell, 2002). All interviews and focus groups took approximately 60 minutes and were transcribed verbatim. Pseudonyms were used to help ensure confidentiality. Online surveys were distributed used SurveyMonkey and took participants approximately 10 minutes to complete. Analysis of qualitative data followed conventional approaches—thematic analysis and the constant comparative method (McMillan & Schumacher, 2006; Springer 2010). All qualitative data were coded using NVivo® analysis software to assist in determining emergent topics, categories and themes. The quantitative data from the surveys were analyzed using descriptive statistics that included percentages, means and frequencies.

**PRE-SERVICE TEACHER EDUCATION: THE ALTERNATIVE PRACTICA**

Teaching is key to student success. Students need teachers who inspire and engage them and foster a climate of wonder, curiosity and inquiry. To advance S.T.E.M. education, a central focus of QCOC is to contribute to pre-service teacher education by providing expanded opportunities through which early career teachers may develop their S.T.E.M. education knowledge.

A unique feature of the BEd program at the Faculty of Education, Queen’s University is the year-end Alternative Practicum.

The Alternative Practicum is a three-week opportunity through which teacher candidates can learn about the abundance of opportunities for learning beyond the schoolhouse door. It provides practice teaching placements in informal learning institutions, community organizations, museums, and recreational settings. The goal of the Alternative Practicum is to illuminate the potential of non-school settings and unconventional, informal pedagogical strategies for teaching and learning. Through experiential teaching and learning opportunities in environments rich in real-world S.T.E.M. phenomena, the Alternative Practicum provides both novice educators and children first-hand occasions to pursue and develop science interests; engage in scientific inquiry; and engage with scientists.

Alternative Practicum Community Placements organized through the QCOC enable teacher candidates to work in non-traditional educational environments and discover the potential for innovative learning opportunities to advance student understanding in literacy and S.T.E.M. subjects.

Between 2010 and 2014, 135 Teacher Candidates participated in Alternative Practicum placements at the Centre, in local and international museums, community organizations and centres, schools and research laboratories.

Through the deliverables from the Alternative Practicum (demonstration lessons, museum education packages, teacher resource materials, working robots, public education events) we are able to achieve a goal central to the Centre’s mission—to include learners of all ages, cultural and socioeconomic backgrounds and abilities in opportunities that bring S.T.E.M. to life in engaging and accessible ways.
Our Centre uses The Arts as an effective vehicle to reach S.T.E.M.-anxious students and challenge deeply embedded, negative societal attitudes towards S.T.E.M. We achieve this through the integration of music, dance and drama into S.T.E.M. subjects. It is known that by Grade 4, children say that while they enjoy science and design technology at school and appreciate the benefits of science and engineering to society, they do not wish to become scientists or engineers (Silver and Rushton, 2008). Other studies show that young students' enjoyment of S.T.E.M. declines each year thereafter until the end of mandatory science and mathematics education (Murphy, Ambusaidi and Beggs, 2006). Since research also shows that a negative disposition towards a subject and a lack of belief in one’s ability to succeed is correlated to low achievement in that subject, it is important for young children to have a positive attitude towards these subjects (Reynolds and Walberg, 1992). It is also essential for adults who have a direct impact on a child’s development to stop perpetuating the myths that S.T.E.M. is difficult, unnecessary, irrelevant and limited to elite students.

In 2013, the QCOC completed a two-year study of the Alternative Practica using a mixed-method design. The purpose of the research was to evaluate the experiences of teacher candidates during their community-based Alternative Practicum. Data were collected through interviews (I) with eight BEd students, seven community leaders who acted as supervisors, an online survey administered to teachers who took their classes to the puppet show, Mathakazam™ (response rate = 55%), and an online survey distributed to teachers who had their classes participate in the Let’s Talk Science program (response rate = 47%).

The qualitative findings indicate that most of the community leaders and BEd students found that the Alternative Practica experience provided unique opportunities to learn about non-traditional teaching opportunities. For example, one BEd student stated,

It opens your eyes to Alternative work environments. [It] gives you an idea of a different way things are done so you can incorporate that into a classroom. Or maybe even work there after graduation, that’s always a possibility—working in colleges, working in museums, working in curriculum design. It’s [the Alternative Practica] a good chance to explore that. It’s also a good chance to apply your knowledge in a very different setting. I think [that is] very useful. (Alex, I)

One of the community leaders agreed when she stated that the BEd students,

Have more options than just being a teacher in a classroom. There are lots of other organizations out there that can make use of their skills…. The teacher candidates get the experience that teaching can occur in lots of different forms. Teaching doesn’t just occur in the classroom, it can occur with all kinds of different community groups. I think this is a definite plus to the program, in that they do get that experience.” (Mandy, I)

The analysis also suggested that the Alternative Practica experience assisted in changing their beliefs and practices about teaching S.T.E.M. education. The community leader for the puppet show stated that the BEd students were shown alternative ways to deliver the S.T.E.M. curriculum and they were telling her, “I like math now. I just want to go and do math” (Abby, I). She stated that the students “had a mental block against it [math], but they were all pumped. That was really neat to see” (Abby, I). One of the BEd students who designed and implemented the Let’s Talk Science workshops for classes stated that he now knows how valuable it is to show students that what they “learn in class can be applied outside of the class…. So it’s useful for them to see what’s out there” (Jordan, I). Another student learned the value of letting youth “experience science” and “going into the classrooms and excite the kids [about science]” (Jeremy, I).

Ninety-five percent of the teachers who viewed the Mathakazam puppet show believed it conveyed an important message about mathematics perceptions and addressed important content. Ninety-two percent stated that they would attend the show with their students again next year. Of the teachers who participated in the science & technology workshops, 100% said they would welcome BEd students into their classes again and they would recommend the suite of S.T.E.M. demonstration lessons to their colleagues to support the mandatory Science and Technology curriculum.
The study highlighted the authentic professional learning the Alternative Practica community placements provided for the BEd candidates in terms of increasing awareness of alternative forms of S.T.E.M. education and the importance of collaborating in non-traditional ways to deliver S.T.E.M. curriculum.

**RESEARCH-BASED INNOVATIONS: COMMUNITY-UNIVERSITY PARTNERSHIPS**

Each year, the QCOC supports a number of local community organizations and agencies whose mandate complements or supplements its own goals and principles. The purpose of the funding is to provide non-profit community organizations with the resources (a Research Assistant and budget for consumable materials) to conduct a study that evaluates the impact of one of their community initiatives.

The Community Research Partnership projects, which are adjudicated annually in August, run from September to April: culminating in a Poster Conference in May which celebrates the studies by sharing the results with local educators, researchers, organizations and community leaders. The community-university relationship has historically been a hierarchical relationship that leads to community groups and university faculty working in parallel toward similar goals, which suggests there is little to no reciprocity of enactment in public education (Warren, 2011). Our belief is that academic and community partnerships must be viewed and valued as multi-dimensional, authentic collaborative approaches and those universities should be involved in local initiatives by seeking out and supporting research essential to representative stakeholders, and making the results accessible and scalable. Very few universities or community-based organizations have collaboratively utilized community partners and graduate students to assist in researching evidence-based community projects that benefit the public in our area (Nicotera, Cutforth, Fretz & Thompson, 2011; O’Meara & Rice, 2005). QCOC is rare in its efforts to conduct evidence-based examinations of our community programs involving community partners, consumer representatives, university faculty, and graduate students: all of whom participate in the research design, implementation, and knowledge mobilization process. Twenty-two local organizations have benefitted from our Community Partnership initiatives to date.

Twenty-six graduate student Research Assistants and 18 BEd teacher candidates have been active participants in the 18 community research studies that have taken place between 2011 and 2014. In some cases, involvement in the QCOC research studies provided career opportunities: One former RA is now the Coordinator of S.T.E.M. Outreach at an Ontario university, four BEd graduates have implemented Family Math programs in their schools, one BEd student became a program Coordinator with Let’s Talk Science and two RAs have used the Community Research project for their graduate thesis research.

In 2013, a two-year study of this initiative was completed. The purpose of this research was to evaluate the strengths and weaknesses of community-university research project collaborations by understanding the adoption and implementation process. The two-year study involved 12 programs that included 12 community
leaders and 12 Research Assistants (RAs) from 2010 –
2012. Data were collected through semi-structured
interviews with 12 community leaders and two RAs,
one focus group of RAs (n = 5) and a document analysis
of the final posters produced from the 12 community
programs funded.

The findings indicated that an overwhelming majority
of both community leaders and RAs believed the
strengths of these research partnerships was due to
mutually collaborative team efforts. For example, one
RA stated that,

I’ve learned that community partnerships…can be
very successful. I think that we established a good
working relationship. I learned a lot about
teachers working together…I learned about the
benefits of doing this kind of collaboration…this
reinforced that these collaborations can work.
(Troy, I)

One of the community leaders supported the notion
that the shared-experience strengthened the
community-university partnership when she stated,
“She [the RA] had some good ideas and she was a part
of our team” (Donna, I).

Providing an opportunity to study S.T.E.M. and literacy
issues of significance to the community was also a
theme that emerged from this study. Laura, an RA with
one of the projects, stated that there were,

A lot of great programs out there but there is
no research behind them. It opened my eyes to
future jobs for myself [because] there is a need
for research and the community is interested in
research—it’s not just the university. There are
practical applications. (Focus Group)

Another RA stated that, as a result of this unique
partnership, it was the first time that she immediately
saw the benefit from the research: ‘I had a
recommendation that came out of the data and I heard
last night that they [have] actually already incorporated
it’ (Emily, Focus Group). One of the community leaders
stated that the research helped to strengthen their
programs’ goals and objectives (Tammy, Interview).
The document analysis of all twelve posters revealed
that all participants, whether a child, youth, adult or
parent/guardian learned from participating in the
community program. For example, the ESSO Family
Math participants learned about the Ontario
mathematics curriculum, resources available, and how
their own perceptions about mathematics influence their
child’s views (Penn, Ramsay, Dalgarno, Colgan, 2012).

Most participants stated that they applied the findings
from these small-scale studies to support on-going
knowledge mobilization efforts for their program and
organization. They also said that the data analysis,
poster and culminating reports facilitated the
dissemination of the findings to a wider audience (e.g.,
conference presentations, newsletters, professional
publications and funding applications). Darcy, one of
the RAs, stated that he had little experience, “with
qualitative research. It was great; I got to conduct an
interview properly [and] I wrote my first qualitative
paper” (I).

It is unique community-university partnerships such
as this that allow community organizations and
universities to learn with, from and about each other
to improve public education outreach opportunities.
When community-university partnerships are redefined
and based on collaboration and reciprocity, everyone
involved both benefits and prospers.

COLLABORATION, PARTICIPATION,
NETWORKS AND PARTNERSHIPS: SCIENCE
RENDEZVOUS PUBLIC EDUCATION

More and more of our youth today are involved in a
wide array of extracurricular activities that enable
them to develop knowledge, skills and social
connections they may not otherwise acquire (Gee,
2001; Lee & Hawkins, 2008). Schools are only one of
a number of learning environments based in a
community that help students learn (Irby, Pittman &
Tolman, 2003). For instance, a recent study by the
National Research Council concludes that “A great deal
of science learning, often unacknowledged, takes place
outside school in informal environments—including
everyday activity, designed spaces, and programs—as
individuals navigate across a range of social settings.”
(Bell et al. 2009, NRC report). Science festivals are one
example of a venue where science learning takes place
outside schools.
Science Rendezvous, one of the largest science festivals in Canada, is a grassroots, non-profit national organization that partners with Canada’s top research institutions to present an annual science festival that is free for everyone. The event takes place annually on university campuses, research institutions and community sites across Canada on the second Saturday in May. As an event dedicated to showcasing the world-class scientific research happening right here in Canada, the goal of Science Rendezvous is public education. Science Rendezvous initiates direct involvement with Canadian science by presenting hands-on activities, exciting demonstrations and explosive experiments, lighting the spark of curiosity necessary to engage with and support Canadian science, technology, engineering and mathematics.

The goal of the program is to promote public understanding of the importance of science to our standard of living and global competitiveness, engage people in science, and to inspire the next generation of researchers and innovators.

QCOC has coordinated Science Rendezvous Kingston for four years. In 2011, there were 25 displays and approximately 500 visitors. By 2014, Science Rendezvous Kingston had become the largest event of its kind in Canada: more than 300 volunteers from 40 Departments, Research Centres, and Laboratories from Queens, The Royal Military College of Canada and St. Lawrence College, and 20 community organizations dedicated to scientific and environmental issues have volunteered their time, expertise and resources so that families and members of the public can meet and talk to scientists, engage in scientific experiments, and learn about the excitement and possibilities of S.T.E.M.. In 2014, 3700 visitors attended Science Rendezvous Kingston at The Rogers K-ROCK Centre. The fifth annual Science Rendezvous Kingston is scheduled for Saturday May 9, 2015 at The Rogers K-ROCK Centre.

A two-year study of Science Rendezvous Kingston has been completed by the CQOC. The purpose of this research was to evaluate Science Rendezvous, and develop recommendations for Science Rendezvous Kingston in the future. Data were collected through semi-structured for 30 interviews and seven focus groups (n = 13) with local scientists (including Graduate Students) and community leaders involved in Science Rendezvous Kingston. An online survey was also administered to anyone from the public (18 years and older) who came to Science Rendezvous Kingston and agreed to participate in the study (response rate = 35%).

Findings from the survey show that 85% of participants stated that science and technology was a subject of concern in their household. Most of the participants found the hands-on activities were age appropriate, engaging and inspired their children to be interested in and positive about science. For example, the following quotes from the survey data support this finding:

“[There were] interesting demonstrations that attract and retain the kids attention. The oscillating chemical reaction was great!”

“[There were] many hands on science activities. Great to see children getting involved and becoming excited about Science.”

“[It was] interactive and accessible for young children. The scientists were entertaining and fun as well as knowledgeable.”

“My daughter loved the goop/slimes, the science magic, dressing up in the hazmat suit to collect soil/water samples, and making paper.”

“Honestly, I and my daughter learned a ton about fundamental aspects of how the world works. Unfortunately, my science teachers were pretty bad as a kid. I wish there were more opportunities like this when I was growing up.”
Survey participants also believed the take-home resources would help them bring science into their home environment. For example, as a result of Science Rendezvous, one parent has taken her children on follow-up visits to the local geology museum. Another parent has performed science experiments, found in the take-home activity book, with her two children.

The preliminary data from the interviews and focus groups also support this finding. For example, one of the scientists stated that, “I had fun. I interacted properly with the people and the people showed an interest in what I was offering” (Harvey, Interview). Another scientist observed that, “It seemed very well attended…. The kids were interested in the material and wanted to hear about it” (Ruby, I).

The scientists also found that they learned effective teaching strategies for disseminating their research in a way that was easily understood to a diverse demographic. As Ruby, one of the scientists stated, “I learned that it’s very hard to explain something quite technical to children but that it can be done and it can be fun. I guess just having that experience is really the benefit for me” (Interview). Another scientist believes she learned a lot from being put in contact with so many different types of people from the general public, ranging from parents, parents who were university professors in other departments, down to two year old child. Explaining my research to that range of people is a strength in terms of what I learned from it [Science Rendezvous]. (Arwen, I)

One of the major themes that emerged from the interview and focus group data was the networking opportunities that Science Rendezvous offered for the scientists involved. Arwen supported this findings when she stated,

I do believe in the initiative, I do think it’s a really important message that’s being delivered. It’s a great way to network and discover other people and other projects that they’re doing within this community that [we] might be able to partner with…. We’ve already created a partnership out of that and that was a strength. (I)

Ninety-eight percent of survey respondents and most of the scientists involved stated that they would attend Science Rendezvous in the future years and would recommend the S.T.E.M. festival to others.

The preliminary qualitative data also suggested that Science Rendezvous helps build stronger communities. “Raising awareness of all of these public education issues only makes for a better community” (Arwen, I).

The findings indicate that Science Rendezvous Kingston met its mandate by generating interest and enthusiasm for science among children and youth, and increasing awareness of the diversity of subjects encompassed by the word “science.” The study also suggests that public events such as this S.T.E.M. festival help build a stronger community.
THE QCOC COMMUNITY-UNIVERSITY PARTNERSHIP MODEL

The three studies shed light on the reciprocal interactions, processes and strategies that informed all QCOC activities and projects. This, in turn, made it possible to model the QCOC as having two complementary pillars that frame, support and inform the initiatives that serve the community and beyond in unique and influential ways: Research-Based Innovations and Collaboration/Participation Networks and Partnerships. There are four components to the first: Pre-Service Teacher Education, Community Research, Informal Education Opportunities and Program Evaluation. The second is also comprised of four components: Public Education, Student Engagement, Professional Growth and Knowledge Mobilization.

As the model illustrates, the “pillars” upon which we base all initiatives are non-hierarchical, dynamic and connected, and have a common goal of advancing literacy and S.T.E.M. education. The work of QCOC strives to bridge the gap between research and practice through its participatory action research projects and professional learning opportunities. The organic flow of the two pillars of the model represents the fundamental tenets upon which all QCOC “outreach” projects are based: collaborative partnerships that are mutually beneficial, established through reciprocal trust and respect, constructed through shared decision-making, and active engagement of all affiliates.

While detail must be added with respect to sequences, steps and a recommended action plan in order to make the QCOC model scalable and of value to other post-secondary institutions that are seeking to embark on meaningful community engagement activities, our experience, research and reflection suggest that it is possible to (1) recruit, support and sustain the commitment of significant numbers of university faculty, staff and students to advance S.T.E.M. education through well-coordinated, high-quality, reciprocally rewarding activities and events; (2) have a positive impact on pre-service teacher education by building collaborative S.T.E.M. mentorship relationships with exceptional artists, scientists and museum educators; (3) improve the S.T.E.M. education experience of students by supporting teachers, parents, educators in informal settings and through resource development; (4) legitimize the power of informal learning experiences and non-traditional teaching environments; (5) empower community-based workers to be action researchers as well as authors and consumers of empirical research; (6) influence public attitudes and beliefs about science, scientists and scientific research; and, (7) coordinate activities across institutions, departments, and organizations to advance S.T.E.M. education.

1 A full description of the activities of the QCOC can be found at http://educ.queensu.ca/community/outreachcentre.html
2 To watch a production of Mathakazam and download the ancillary resource package developed to support teachers whose classes attended the performance, please visit http://educ.queensu.ca/community/outreachcentre/resources.html

SCIENCE RENDEZVOUS KINGSTON 2013 AND 2014
In 2013 and 2014, Science Rendezvous Kingston was held at The Rogers K-ROCK Centre, the city’s largest venue. In response to energetic social media campaigns (including promotional videos by CBC’s Rick Mercer, Kingston Mayor, Mark Gerretson, Kingston & The Islands MP, Ted Hsu, and local scientists (including our award-winning WA.F.F.L.E.S. robotics team) and a formal Mayoral proclamation that the second Saturday in May is Science Rendezvous Kingston day, local families flocked to The Rogers K-ROCK Centre to receive their take-home package (complete with a water-testing kit and a book of kitchen-sink science experiments) and participate in everything from surgical simulations and bridge breaking to chemistry magic and laser lightshows. In 2014, 3700 people attended, exceeding the 2013 attendance by 1250. In the first half hour of Science Rendezvous Kingston 2014, 750 people passed through the doors of The Rogers K-ROCK Centre. Among the most popular displays were those outside on The Tragically Hip Way by The Kingston Police Canine Unit and The Queen's Baja Team. Inside, response was overwhelmingly positive for The Widget Workshop, Smarty the SLC Robot, The Salamander Meet and Greet and Liberi—a video game that requires your leg power and a bicycle to power up. A new feature in 2014 was The Pop Up Curiosity Shop sponsored by COU. At the booth, members of the public could pose any question of their choice to a scientist. They ask their questions by video and then an Ontario university researcher responds with videos posted on the Research Matters website. Madison, a 5 year old, posed the question, Is God a boy or a girl? Dr. Richard Ascough, Queen's University Researcher and Director of the School of Religion, provided this response to Madison:

Dear Madison,

What a good question. The fancy way of asking it is “What is the nature of God?” but your question gets right to one of the key things. By asking this question, you are like many of the smartest researchers and thinkers in history who have thought about this for a long time.

In fact, many different religions in the world have also tried to find the answer to this question. In some religions, God is presented as a boy but other religions God is presented as a girl. Since no one has ever seen God it is hard to know for sure. Many people think that God is a combination of the best of “boys” and the best of “girls” – that way, nothing is left out.

Because this is such a hard question to answer, I think it is best to let people think about God the way that they find to be the most helpful. So, if you want to think about God as a girl, that’s okay, but if you want to think about God as a boy, that’s okay too. Or, you can even think of God as both. I don’t think God will mind either way.

Richard
In order to encourage Science Rendezvous Kingston visitors to return year after year and entice new participants to attend, plans are in process for exciting new booths for May 9, 2015. New features include the Giant Colon: a state of the art 40-foot long by 8-foot high, pink inflatable walk-through reproduction of the human colon. The Giant Colon exhibit has been created to inform the public about the signs and symptoms of colorectal cancer as well as the other diseases of the colon. This fun and interesting multimedia experience provides important health information, helping to encourage colorectal cancer primary prevention and screening across the country. During their voyage through The Giant Colon, the public will view everything on a large scale, from Giant Hemorrhoids to Giant Polyps and much more. The three-dimensional interior also features Ulcerative Colitis, Rectal Cancer, Diverticulitis, Crohn’s Disease and Advanced Stage Colorectal Cancer.

On the following pages, we honour the individuals who organized and operated stations at Science Rendezvous Kingston, and we once again acknowledge the support of funders, sponsors, donors, and “boosters”—all of whom made the difference in one way or another to bring Science Rendezvous Kingston to fruition.

Special thanks are extended to Kim Garrett, Co-Coordinator. Kim attended the first Science Rendezvous Kingston in 2011, and was so thrilled by her sons’ excitement about the event, that she volunteered to help in 2012. Since then, she has become the Co-Coordinator of the event: involved in everything from sponsorship and certificate production to troubleshooting and publicity. Hats off to Kim!

Thanks too to Jeffrey Wamboldt, who patiently assembled more than 1000 take-home packages over four days...only to see almost all of them disappear in the first 30 minutes after doors opened. Willing to step up to the plate and help wherever assistance is needed, Jeffrey assembled The Research Matters booth, assisted with set-up and tear-down, served as a traffic warden and never stopped smiling. You are our superstar all-rounder, Jeff!

Special contributions were made by Kyle Clarke, who coordinated the high school volunteers and problem-solved throughout the day, helping the event to run smoothly for presenters and the public.

Social media at Science Rendezvous Kingston was under the capable hands of Adrienne Montgomerie, who made our presence on the web widespread and impressive. Thanks, Adrienne.
SCIENCE RENDEZVOUS KINGSTON
SCIENCE RENDEZVOUS KINGSTON

SCIENCE RENDEZVOUS 2013 PARTICIPANTS

Canadian Association for Girls in Science (CAGIS) – Kingston Chapter
Cataract Region Conservation Authority
FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
Henk Wevers, (Professor Emeritus, Mechanical Engineering Queen’s)
K-Botics
Kingston Field Naturalists
Kingston Frontenac Public Library
Kingston Police Force
Let’s Talk Science
MacLachlan Woodworking Museum
Miller Museum of Geology
Ministry of Transportation
MP Ted Hsu
Museum of Health Care at Kingston
Prince Edward Point Bird Observatory
Pump House
Queen’s KGH & Hotel Dieu Hospitals, Human Mobility Research Centre
Salamander Conservation
St. Lawrence College
The Real Batman
W.A.F.F.L.E.S. Community Robotics

Queen’s University
Baja SAE Design Team
Biological Station and the Elbow Lake Environmental Education Centre
Centre for Neuroscience Studies
Child & Adolescent Development Group
Department of Psychology
Clinical Simulation Centre
Department of Chemistry
Department of Electrical & Computer Engineering
Department of Pathology & Molecular Medicine Graduate Students

Department of Physics, Engineering Physics & Astronomy: Ultrafast Environmental Education Centre
Faculty of Engineering and Applied Science
Geological Sciences and Engineering Laboratory for Percutaneous Surgery, School of Computing
Solar Design Team (QSDT)
Space Engineering Team

Royal Military College of Canada
Astronomy and Astrophysics
Biology
Chemistry
Civil Engineering
DNA/Animal Physiology
Environmental Engineering
Environmental Contaminants
Environmental Field Work in the Arctic
Inorganic Chemistry
Nuclear Engineering

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Utilities Kingston

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Jessamyn Little
Cataract Region Conservation Authority
Matt Ellerbeck
FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
Linda Lamoureux
Elizabeth Suriyuth
K-Botics
Kevin Wood
Kingston Field Naturalists
Shirley French
Kingston Frontenac Public Library
Kimberly Sutherland-Mills
Kingston Police Force
Sgt. Lillian Walcer
Let’s Talk Science
Marc Li
MacLachlan Woodworking Museum
Tom Riddolls
Miller Museum of Geology
Mark Badham
Ministry of Transportation
Michael Matthews
MP Ted Hsu: Talks Science
Ted Hsu
Museum of Health Care at Kingston
Jenny Stepa

Prince Edward Point Bird Observatory
Peter Fuller

Salamander Conservation
Matt Ellerbeck

St. Lawrence College (ESET)
Steve Lapp

The Magic of Steam
Henk Wevers, (Professor Emeritus, Mechanical Engineering Queen’s)

The Pump House Steam Museum
Gordon Robinson

The Real Batman
Matt Saunders

W.A.F.F.L.E.S. Community Robotics
Christine Bibic

Queen’s University
Baja SAE Design Team
Luke Darron

Biological Station and the Elbow Lake Environmental Education Centre
Mark Andrew Conboy

Centre for Neuroscience Studies
Kasey Hemington

Child & Adolescent Development
Group Department of Psychology
Valerie Kuhlmeier

Clinical Simulation Centre
Kim Garrison

Department of Chemistry
Gillian Mackey

Department of Chemistry
Philip Jessop

Department of Electrical & Computer Engineering
Michael Greenspan

Department of Pathology & Molecular Medicine Graduate Students
Mackenzie Bowman

Department of Physics, Engineering Physics & Astronomy: Ultrafast
Anneke Timan

Faculty of Engineering and Applied Science
Maria Lahiffe

Geological Sciences and Engineering
Ryan Dhillon

Laboratory for Percutaneous Surgery, School of Computing
Tamas Ungi

Solar Design Team (QSDT)
Graham Calvin

Space Engineering Team
Jessica Stieves

Queen’s KGH & Hotel Dieu Hospitals, Human Mobility Research Centre
Joan Willison

Royal Military College of Canada
Astronomy and Astrophysics
Karen Lee-Waddell

Biology
Barbara Zeeb

Chemistry
Neda Bavarian

Civil Engineering
Kristine Mattson

DNA/Animal Physiology
Valerie Langlois

Environmental Engineering
Kela Weber

Environmental Contaminants
Daniela Loock / Dean Morrow

Environmental Field Work in the Arctic
Daniela Loock / Dean Morrow

Inorganic Chemistry
Jennifer Scott

Nuclear Fuel Research
Kathy Nielsen

VOLUNTEERS

The Royal Military College of Canada
SR 2013 Volunteers

Adrian Pang
Alexandre David-Uraz
Andrea Ellis
Andrew Prudil
Bardia Tabiatnejad
Bob Whitehead
Brian Campbell
Chris Withers

Cody Garrett
Cosmo Lauzon
Daniel Mullins
Diana Flood
Dustin Ellis
Dylan Pierce
Fawzy Ezein
Grant Norman
Ian Goode
Jeffrey MacDonald
Joanna Asia Zolnierczyk
Justine Denoncourt
Justine Deveau
Kathryn Eagles
Kelly Milliken
Kim House
Kira MacDougall
Laura Gibson
Lauren Forrester
Lee-Ann Sills
Lindsay Holmes
Mackenzie Denyes
Maria Iligan
Megan Lord-Hoyle
Michele Parisien
Michelle Bégin-Major
Nick Vlachopoulos
Paul Chan
Rob Williams
Robert Waddell
Shari Reed
Sharilynn Hoobin
Shawn Burdett
Sheila Johnston
Sonja Bissegger
Stephanie Flood
Surmita Paul
Teresa Liu
Yasan Qasrawi
SCIENCE RENDEZVOUS KINGSTON

SCIENCE RENDEZVOUS 2013 PARTICIPANTS

Queen’s University Volunteers
Adam Hall
Alicia Clark
Andres Acevedo
Andrew Ironside
Andrew Yawordski
Anezka Radkova
Angelina Paolozza
Anne Prouse
Ashley McMath
Ashley Parr
Bart Warren
Ben Chang
Brandon Moore
Chris Carrick
Christene Smith
Dan Johnson
David Taylor
Deng Pan
Eric Moult
Ethan Heming
Gillian Woodruff
Greg Burzynski
Hailey McInnis
Jackie Leonard
James McLean
Jeannette Benson
Jenn Bentz
Jessica Lougheed
John Saunders
Josh Haberer
Kasey Hemington
Kathleen Merwin
Katie Groom
Kevin Hughes
Kevin McCathie
Kyle Boniface
Lili Mats
Lindsey Hawke
Manjunath Anand
Marie Barnes
Mark Sabbagh
Melanie Robb
Mitchel Anderson
Mohsen Omrani
Nausheen Sadiq
Nicholas Andrews
Noor Al Dahhan
Pablo Sabbagh
Paul Stewart
Portia Murray
Prashant Agrawal
Rohanna Gibson
Ruth Johnson
Ruxandra Filip
Ryan Anderson
Salar Awan
Samantha Voth
Scott Robson
Sean Connolly
Silvia Albanes
Sophie Craig
Sydney Koby
Tamara deWinter
Trisha Ang
Victoria Hoskin
Will Phippen

Let’s Talk Science
Amanda Elridge
Amanda Lam
Asad Chishi
Cenk Aytimur
Cindy Zhu
Circe Malhoney
David Lougheed
Dima Hejleh
Elizabeth Jalouague

FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
Grant Norman
Jada Kish
Justin Biraben
Justine Ring
Laura Beckel
Mac Lamoureux
Marina Fellenz
Reimy Mulligan
Student Presenters
Sydney Mosaheb

The Magic of Steam
Klaus Bescherer-Nachtman

Kingston Field Naturalists
Ariel Gittens
Janis Grant

Kingston Frontenac Public Library
Brenda MacDonald
Brianne Peters
Emma Bell
Jacyln Quail

Kingston Police Force
Constable Chris Gowan
Constable Jeff Huddleston
Sergeant Darren Keuhl
Sergeant Lillian Walcer
Sergeant Steve Saunders

Station Volunteers SR 2013

Canadian Association for Girls in Science (CAGIS) – Kingston Chapter
Brad Cotten
Laura Hull
Mei-Ni Belzile

Cataraqui Region Conservation Authority
Clinton Alexander
MacLachlan Woodworking Museum
Jamie McKenzie-Naish
Tristan Crawford

Miller Museum of Geology
Brad Badham
Farisa Mohammed

Ministry of Transportation
Aaron Thompson
Emily Agar
Michael See
Nigel Day
Steve Bruce

Museum of Health Care at Kingston
Kelly Buckholtz
Stephanie Stobbe

Prince Edward Point Bird Observatory
Carolyn Barnes
Vickie Clowater

The Pump House Steam Museum
Lindley Kenny
Melissa Cruise
Sarah McDonald

K-Botics
Brianna Hill
Hope Yen
Kaitlyn Diederichs
Lizzie Diederichs
Michael Babiuk
Olivia Siemons
Rodrigo Fernandez
Russell Dawes
Sam McWhirter
Sam Tabor
Sawyer Shipp-Wiedersprecher
Wesley Dossett

Queen’s KGH & Hotel Dieu Hospitals, Human Mobility Research Centre
Leone Ploeg
Lydia North
Yvonne Schumacher

Salamander Conservation
Clinton Alexander

MP Ted Hsu Talks Science
Maddy Ross
Megan Stiff
Nicole Honderich
Rafael Rodriguez
Raly Chakarova
Sam Gregory

The Real Batman
Rebekah McNeilly

W.A.F.F.L.E.S. Community Robotic
Goran Bibic
Kaley Bibic
Laurie Gray

Queen’s Community Outreach Centre
Jeffrey Wamboldt
Josh Haberer
Kim Garrett
Kyle Clarke
Lynda Colgan
Nancy Dalgarno
Sophie Craig

High School Volunteer Coordinator
Mary- Anne Reid

High School Volunteers
We had volunteers from:
Ernestown Secondary School
Kingston Collegiate and Vocational Institute

LaSalle Secondary School
Regiopolis Notre Dame High School

Science Rendezvous 2013 Photographer
Guillaume Nolet
SCIENCE RENDEZVOUS KINGSTON

SCIENCE RENDEZVOUS 2014 PARTICIPANTS

Cataracaui Region Conservation Authority
Cyber Falcons FSS Robotics Team
Emergency Response Team
Canine Unit
FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
Firefly Adventures
Heirloom Seed Sanctuary
Henk Wevers, (Professor Emeritus, Mechanical Engineering Queen’s)
K-Botics KCVI Robotics Team
Kingston Field Naturalists
Kingston Frontenac Public Library
Kingston MakerSpace
Kingston Police Force
Kingston Police Force Emergency Response Team
Leahurst College
Let’s Talk Science
MacLachlan Woodworking Museum
Miller Museum of Geology
Museum of Health Care at Kingston
Optical Society of America
Professional Engineers of Ontario
Salamander Conservation
Ted Hsu MP
The Pump House Steam Museum
W.A.F.F.L.E.S. Community Robotics

Queen’s University
Biomechanics and Ergonomics Lab in the School of Kinesiology
Baja SAE Design Team
Biological Station (QUBS)
Centre for Neuroscience Studies
Child & Adolescent Development Group Department of Psychology
Clinical Simulation Centre
Community Outreach Centre, The Widget Workshop
Department of Mechanical & Materials Engineering
Department of Physics SNOlab
Department of Chemistry, Magic Show
Equis Lab
Faculty of Engineering and Applied Science
Laboratory for Percutaneous Surgery, School of Computing
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Research Matters “Ask a Scientist” Curiosity Shop
Solar Design Team (QSDT)

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Lydia North
Firefly Adventures
Walt Sepic
FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
Linda Lamoureux
Elizabeth Suriyuth
Heirloom Seed Sanctuary
Cate Henderson and Mike Hammond
K-Botics (KCVI Robotics Team)
Kevin Wood
Kingston Frontenac Public Library
Kimberly Sutherland-Mills
Kingston MakerSpace
Ryan D’Eon
Kingston Police Force
Emergency Response Team
Canine Unit
Constable Jeff Dickson
Leahurst College
Elizabeth Turkce
Let’s Talk Science
Marc Li

20 QUEEN’S COMMUNITY OUTREACH CENTRE ANNUAL REPORT 2013/2014
Queen’s Research Services and Council of Ontario Universities
Research Matters “Ask a Scientist”
Curiosity Shop
Melinda Knox

Ted Hsu MP Talks Science
MP Ted Hsu

W.A.F.F.L.E.S. Community Robotics
Christine Bibic

Queen’s University
Baja SAE Design Team
Biological Station (QUBS)
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Biomechanics and Ergonomics Lab in the School of Kinesiology
Tara Diesbourg

Centre for Neuroscience Studies
Angela Luedke

Chemistry Magic Show
Department of Chemistry
Michael Mombourquette

Child & Adolescent Development Group Department of Psychology
Valerie Kuhlmeier

Clinical Simulation Centre
Kim Garrison

Community Outreach Centre
Widget Workshop
Brittany Walker

Department of Mechanical & Materials Engineering
Connor Scullion

Department of Physics SNOLab
Alvine Kamaha

Department of Chemistry
Gillian Mackey

Equis Lab
Nicholas Graham

Faculty of Engineering and Applied Science
Maria Lahiffe

Henk Wevers, (Professor Emeritus, Mechanical Engineering Queen’s)
Henk Wevers

Laboratory for Percutaneous Surgery, School of Computing
Tamas Ungi

Loock Lab
Department of Chemistry
Peter Loock

Solar Design Team (QSDT)
Graham Calvin

Cataracti Region Conservation Authority
Matt Ellerbeck

Kingston Field Naturalists
Shirley French

Miller Museum of Geology
Mark Badham

MacLachlan Woodworking Museum
Tom Riddolls

Museum of Health Care at Kingston
Jenny Stepa

Salamander Conservation
Matt Ellerbeck

The Pump House Steam Museum
Gordon Robinson

St. Lawrence College
Control Engineering Technology
Jason Murduck

Energy Systems Engineering Technology ESET
Dave Athersych

Sustainable Energy Applied Research Centre SEARC
Gordon McAlary

Optical Society of America
Mitchell Anderson

Professional Engineers of Ontario
Nicholas Vlachopoulos

Royal Military College of Canada
Astronomy and Astrophysics
Karen Lee-Waddell

Biology
Barb Zeeb

Biology
Sarah Wallace

Chemistry
Bob Whitehead

Chemistry
Jennifer Scott

Civil Engineering
Kristine Mattson

Environmental Sciences Group
Dean Morrow

VOLUNTEERS

RMCC SR 2014 Volunteers
Alexandre David-Uraz
Arman Poonja
Christina Emerton
Colin Lewis
James Sikora
Jing Zhang
Joannah Whitehead
Kaitlin McSorley
Katryn Cosway
Kim House
Kristen Avarmaa
Kyle Naylor
Laura Gibson
Laura Locklin
Lee-Ann Sills
Lindsay Holmes
Mackenzie Denyes
Mark Button
Martin Douglas
Maxime Bosse
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Michele Parisien
Michelle Nearing
Nicholas Saulnier
Paul Goff
Sam McNeill
Shari Reed
Sheila Johnston
Sonja Bissegger
Tash-Lynn Colson
Yazan Qasrawi
SCIENCE RENDEZVOUS KINGSTON

SCIENCE RENDEZVOUS 2014 PARTICIPANTS

Queen’s University Volunteers
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Amy MacLean
Andy Song
Angelina Paolozza
Ani Macy
Ashley Parr
Bailey Piggott
Ben Broerman
Benedict Chang
Brian Bestvater
Chad Richards
Cheryl Savery
Chris Bailey
Chris Bortolaso
Chris Carrick
Chris Ziebenhaus
Christene Smith
Curtis Tremblay
Danielle Porter
David Simon
Emily Klaassen
Ethan Heming
Franklin King
Ian Lam Wheng-Kit
Jeff Crouse
Jessica Ho
Jessica Loughheed
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Joshua Bonatt
Kathleen Merwin
Khawaja Ali
Lili Mats
Lily Huang
Lisa Saunders
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Maggie Hulbert
Mallory Ketcheson
Manjunath Anand
Maria Lahiffe
Marie Barnes
Matt Oskamp
Matt Pearson
Matthew Holden
Michaela Thomas
Michelle Lammes
Mona Ashrakhorasani
Nausheen Sadiq
Nic Andrews
Paradorn Pasuthip
Pat Costigan
Paul Makhoul
Prashant Agrawal
Ruxandra Filip
Ryan Anderson
Ryan Anderson
Samantha Drover
Samantha Voth
Satoko Asahi
Sean Mombourquette
Shelly Bursick
Stanka Fitneva
Stephen Soncin
Tamas Ungi
Tamh Adhikari

Kingston Frontenac Public Library
Alison Dunn
Amie Pilgrim
Brienne Peters
Huda Shaltry

Ted Hsu MP Talks Science
Amy Blaser
Dasvinder Kambo
Jean Holloway
Katherine Dearborn
Lucas Brehaut

Heirloom Seed Sanctuary
Cerridwyn Cox-Henderson
Lynn Scott
Melanie Robb
Sister Alda Brady

Queen’s Research Services and Councils of Ontario Universities
Research Matters “Ask a Scientist”
Curiosity Shop
Chloe Hudson
Deborah Durbin
Erin Clow
Saba Farbodkia

Kingston Police Force Canine Unit
Constable Jeff Dickson and Zeus
Constable Mark McCreary and Titan

Kingston Police Force Emergency Response Team (Tactical Unit)
Constable Chris Gowan
Constable Jeff Huddleston
Constable Ryan Lawlor
Sergeant Darren Keuhl

Let’s Talk Science
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Haixia Jin
Sean George

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Anica Bibic
Antonio Pereira
Brennan Bibic
Eden Bibic
Goran Bibic
Kaley Bibic
Leanne Baksh
Logan Bibic
Matthew North
Michael Allen
Rebecca Austin
Ryan Cooper
Sam Thompson
Sarah Byers
Theo Collins

Cyber Falcons FSS Robotics Team
Brian Basquinha
James Spencer
Rhonda Bird

K-Botics
Anna Leuprecht
Ava Stephanovich-Thomson
Basil Pinkerton
Bonnie Chan
Dylan Moore
Eddie Brown
Griffin Sawchuck
KCVI Robotics Team
LEGO robotics team:
Sam McWhirter
Sam Tabor
Spencer Wilson
Teacher: Wendy Dossett
Wesley Dossett

FLASF Science Fair- Frontenac, Lennox and Addington Science Fair
David Creber
Kathy Creber
Mark Labrecque

Miller Museum of Geology
Brad Badham

Museum of Health Care at Kingston
Marissa Correia
Yan Ding

Pump House Steam Museum
Melissa Cruise

Cataraqui Region Conservation Authority
Clint Alexander

Salamander Conservation
Clint Alexander

Kingston Field Naturalists
Mark Read
William Porter

St Lawrence College
Sustainable Energy Applied Research Centre SEARC
Mollie Smith
Michael Clarke

Energy Systems Engineering Technology ESET
Steve Lapp

Professional Engineers of Ontario
Brenden MacKinnon
Chantal Chiddle
Doug Hamilton
Jeff Oke

Optical Society of America
Chris Galbraith
Faleh Altal
Mohsen Kamandar
Nishan Singh Mann

Widget Workshop
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Jennifer Gasgonia
Pamela McDonald

Leahurst College
Carly Hills
Catia Olmstead
Cole Sequillion
Eden Bibic
Eden Bibic
Emily Kate Taylor
Hana Turkce
Isla Turkce
Josh Sequillion
Michelle DeOlveira
Pete Galbraith
Ryan McIver

Queen’s Community Outreach Centre
Fergus Murdoch
Jeffrey Wamboldt
Josh Haberer
Kim Garrett
Kyle Clarke
Lynda Colgan
Nancy Dalgarno
Sophie Craig

Social Media Coordinator
Adrienne Montgomerie

Photographer
Guillaume Nolet

High School Volunteer Coordinator
Kyle Clarke
ALTERNATIVE PRACTICUM
2013 AND 2014
The Faculty of Education Community Outreach Centre at Queen’s university is situated in a small urban setting in which there is a significant number of STEM-rich museums, nature facilities, arts and literacy cooperatives, and post-secondary institutions. Twenty-six teacher candidates participated in one of 16 community-based projects coordinated by The Education Community Outreach Centre. The field placements were selected because of their potential to provide in-situation professional development opportunities and authentic hands-on learning experiences in STEM, the nature of scientific work, and specific STEM topics/issues through informal contexts. Mentored by field-based experts including museum educators, research scientists and professional artists, the TCs engaged in authentic tasks to support outside-of-the-classroom STEM learning. These tasks provided non-traditional learning opportunities for students and teachers, and resulted in the creation of a suite of classroom tools and family related resources. Through experiential opportunities in environments that support real-world literacy and situated STEM experiences, the Alternative Practicum provides novice educators, community educators, children, youth and families with first-hand occasions to both pursue and develop literacy and STEM knowledge, skills and interests.
The scope of the impact of the Alternative Practicum is impressive in terms of the number of individuals who benefit from the mentor-mentee relationships. As a result of the 2014 partnership between the QCOC and Let’s Talk Science, STEM demonstration lessons were experienced by more than 1500 children in 30 schools from Picton in the west to Brockville in the east, and north to Sharbot Lake, a significant increase from the 2012 partnership. The Widget Workshop development process provided exciting hands-on STEM take-home projects for over 2000 children at Science Rendezvous Kingston 2014. Curriculum developed was implemented not only at Science Rendezvous Kingston 2014, but as important components of local interactive museum installations: experienced by thousands of families, including international visitors as well as school groups. Those resources developed “in-house,” including original music, teaching resources and parent support materials are available at no charge on the QCOC website: http://educ.queensu.ca/coc/resources. As a testament to their high quality and utility, links to the QCOC’s Resources for Parents and Teachers library has links from The Education, Quality and Accountability Office Parent Outreach branch and The Ministry of Education Parent Involvement Committee site.
While the benefits of the Alternative Practicum are obvious to the children, parents, and educators who experience them first-hand, or vicariously via their rich products, it is important to acknowledge that the contribution of the mentors who so generously give their time and expertise to inspire and support The Faculty of Education’s teacher candidates. The mentors are invaluable to the teacher candidates in terms of the help they provide in setting career goals, locating professional resources and organizations, interpreting and meeting professional standards, and improving the mentees’ pedagogical skills. These partnerships are uniquely educative experiences of incalculable value for our TCs, and are possible only because community members accept the challenge to add the job of “mentor” to their already overflowing list of roles and responsibilities.
## Alternative Practicum

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Mentors</th>
<th>BEd Teacher Candidates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>MacLachlan Woodworking Museum</td>
<td>Tom Riddolls</td>
<td>Jamie McKenzie-Naish</td>
</tr>
<tr>
<td>2013</td>
<td>Miller Museum of Geology</td>
<td>Mark Badham</td>
<td>Faria Mohammed</td>
</tr>
<tr>
<td>2013</td>
<td>Museum of Healthcare</td>
<td>Jenny Stepa</td>
<td>Stephanie Stobbe</td>
</tr>
<tr>
<td></td>
<td>Queen's Community Outreach Centre Science Rendezvous 2013</td>
<td>Lynda Colgan</td>
<td>Dustin Garrett</td>
</tr>
<tr>
<td></td>
<td>Take-Home Book Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>The Royal Military College of Canada ScienceWORKS!!!</td>
<td>Kela Weber</td>
<td>Joanna Zolnierczyk</td>
</tr>
<tr>
<td>2014</td>
<td>Queen's Community Outreach Centre Family Math Program</td>
<td>Lynda Colgan</td>
<td>Tina Ostonal</td>
</tr>
<tr>
<td></td>
<td>Healthier Minds Through Songs and Rhymes</td>
<td>Gary Rasberry</td>
<td>Carly McFadden</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Justin Bell</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lucas Kolar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meagan Shannon</td>
</tr>
<tr>
<td></td>
<td>Kingston Literacy &amp; Skills</td>
<td>Stacy Watson, Martha Rudden, Anne Jackson</td>
<td>Carlee Duchesne, Lindsay Bell, Mikalena Halos</td>
</tr>
<tr>
<td></td>
<td>Let's Talk Science</td>
<td>Marc Li</td>
<td>Brittany Walker, Janica Gasgioni, Jennifer Ducharme</td>
</tr>
<tr>
<td>2014</td>
<td>Museum of Healthcare</td>
<td>Jenny Brown</td>
<td>Amanda Luongo, Christina Spensieri</td>
</tr>
<tr>
<td>2014</td>
<td>The Pumphouse Steam Museum</td>
<td>Gordon Robinson</td>
<td>Pamela McDonald</td>
</tr>
<tr>
<td>2014</td>
<td>The Kingston Boys and Girls Club</td>
<td>Henk Wevers</td>
<td>Monika Szpytko</td>
</tr>
<tr>
<td>2014</td>
<td>The Museum of Mathematics, New York City</td>
<td>Cindy Lawrence</td>
<td>Heather Maltby, Janelle Petrusma</td>
</tr>
<tr>
<td>2014</td>
<td>The Royal Military College of Canada ScienceWORKS!!!</td>
<td>Jennifer Scott</td>
<td>Anisia Bastasic, Jennifer Howard</td>
</tr>
<tr>
<td>2014</td>
<td>TVO Math Curriculum Development</td>
<td>Pat Ellingson</td>
<td>Conor Doan, Stefania Strati</td>
</tr>
<tr>
<td>2014</td>
<td>W.A.F.L.E.S. Community Robotics</td>
<td>Christine Bibic</td>
<td>Chris Darnell</td>
</tr>
<tr>
<td>2014</td>
<td>Queen's Community Outreach Centre, The Widget Workshop</td>
<td>Lynda Colgan</td>
<td>Brittany Walker</td>
</tr>
</tbody>
</table>
COMMUNITY RESEARCH PARTNERSHIPS
In Kingston, there are many not-for-profit (NFP) organizations and community groups that are dedicated to working to improve the lives of families through education in its multiplicity of forms: informal instruction, pre-school programs, after-school clubs, targeted curricula for adults and/or special needs populations, and alternative teaching.

Among the many challenges that these organizations face are issues of funding, building public trust and strategic planning. For example, prospective funders require empirical data to show the impact of the previous financial investment awarded to the organization. With many groups competing for funding from the same dwindling sources, not-for-profit organizations must be knowledgeable in terms of case-building for the purposes of grant-writing and sustainability.

To this end, the QCOC worked to accomplish its mission (i.e., to work with community partners, learning together to expand the opportunities, strategies and resources available to help teachers, families and volunteers improve children’s learning in literacy, science, technology, engineering and mathematics). This has been done by supporting community research projects through an adjudicated grant application process. The QCOC offered Community Research Partnership Grants to community organizations with the purpose of providing resources to study the impact of its programs. In addition to $5000 funding for consumable materials and operating expenses, the QCOC provided successful applicants with one graduate student Research Assistant (RA) to support each research project. QCOC faculty and staff, the RAs and with community leaders collaborated to articulate a research question about a particular aspect of the NFP’s activities, and then developed a plan to collect, analyze and interpret the data. Results were then used by the NFPs to refine and revise particular implementations, participate in knowledge mobilization processes (e.g., conference presentations) and generate research-based funding applications; and, by the academic partners to generate articles for peer-reviewed publication and conference presentations.
COMMUNITY RESEARCH PARTNERSHIPS

2013 COMMUNITY RESEARCH PARTNERSHIPS’ SUMMARY OF FINDINGS

H’ART SCHOOL OF SMILES

THE EXPERIENCES OF STUDENTS WITH INTELLECTUAL DISABILITY AND THEIR TEACHERS DURING THE IMPLEMENTATION PROCESS OF AN AUGMENTATIVE AND ALTERNATIVE COMMUNICATION DEVICE

Partners
Katherine Porter, Executive Director, H’art
Toni Thornton, Educational Director, H’art

Teachers
Anita Boldt, H’art
Diane Kearnan, H’art
Amanda Charbonneau, H’art

Speech and Language Pathologists
Christiane Curtis
Nicole Murphy (Assistant)

Research Assistant
Leslie Patterson, MEd Candidate, Queen’s

This study sought to describe the implementation process of an Augmentative and Alternative Communication (AAC) device in a classroom at a school for adults with intellectual disabilities, and how the use of the device relates to communication and participation in the classroom.

Efforts between the researcher, the teachers, and the Speech and Language Pathologist (SLP) allowed for a collaborative research design. The researcher described participant perspectives regarding student communication and engagement before, during, and after the AAC device training. Additional training took place as a result of the findings.
Two students were selected by the H’Art staff and invited to join the study based on their challenges producing speech. All three teachers at the school participated in the study. One of the teachers recruited a SLP based on her experience with and knowledge of speech-generating devices.

A qualitative methodology and emergent design were used in this study, which included:

- a three-month data collection period
- 20 hours of in-class observations
- weekly journaling by teacher participants
- post-intervention interviews with all participants (approximately one-hour each)
- two additional training sessions (based on recommendations from staff obtained during interviews)

Student communication and participation before the AAC device was implemented were limited: they primarily used body language, sign language, and simple (one or two word) sentences. Students were passive communicators, relying on others to ask questions that could be answered with a “yes” or “no”. Students appeared engaged in classroom activities, but many of the activities were language-based, consequently, participation was a minimal.

“Students were in a passive role. You couldn’t really ask an open-ended question... and initiation came from the teachers.”

Student communication and participation changed throughout the integration of the AAC device. Students were able to make requests and initiate conversations using their AAC device. They were able to ask and answer questions during class discussions. Non-verbal communication also continued, and students were encouraged to use their device simultaneously.

Teachers faced many challenges in their efforts to support the implementation of the AAC device due to:

- a lack of time for scheduling training,
- reading relevant materials provided by the SLP,
- programming the device, and
- planning classroom activities to provide opportunities for communication.

There were logistical challenges to conducting the in-class teacher training. There were only three teachers at the school, and they were all teaching students while they were being trained. These teachers were preoccupied and were not able to participate in the in-class coaching. As a result, a follow-up session was conducted. The SLP and her assistant provided an additional session where they modeled a lesson so teachers could focus on learning process.

Three primary themes emerged from the study:

1. In-class training was necessary for successful implementation.

2. The AAC device improved communication and participation in class for the student participants.

3. Teachers needed time to learn and incorporate the device into their classrooms to support student communication.
KINGSTON LITERACY AND SKILLS

FAMILY LITERACY EXAMINED: A CASE STUDY EXPLORING THE OUTCOMES OF THE READING AND PARENTS PROGRAM (RAPP) OFFERED BY KINGSTON LITERACY & SKILLS (KLS) TO PARENTS AND PRE-SCHOOL CHILDREN

Partners
Deb Nesbitt-Munroe, KL&S
Anne Jackson, KL&S
Molly Wright, Ontario Early Years Centre, Kingston
Sherry Aylesworth, Ontario Early Years Centre, Kingston
Michelle Cole, Better Beginnings for Kingston Children
Andrea Lillis, BEd Teacher Candidate, Queen’s

Research Assistant
Connie Taylor, PhD Candidate, Queen’s
The RAPP program loans high-quality children’s books along with age-appropriate early language and literacy development suggestions based on the book including related rhymes, poems, crafts and activities. Parents sign up to borrow RAPP books at specific playgroups. The RAPP facilitator visits these playgroups weekly or bi-weekly to loan RAPP packs that are tailor-made for individual families according to the number and ages of children in the household. Since 2008 over 3500 RAPP packs have been delivered to families in the Kingston Frontenac and Lennox and Addington areas. The RAPP packs are loaned for one-week or two-week periods and families return the packs along with the books (they may keep the printed crafts, activities, and supporting materials). Once their pack is returned, the family collects a new pack.

Parents in this study consistently reported their children recognized and looked forward to the RAPP packages. One parent said of her daughter’s reaction to the RAPP packs: “She’s really interested in it and she’s always looking forward for that big package that she gets on Thursdays.”

The objective of this case study was to examine the effect and outcomes of one family reading program, Reading and Parents Program (RAPP), to determine if this program influences parents to read aloud and engage in early language and literacy activities at home with their children. This study aimed to determine if RAPP positively influences parents to provide additional, richer home-based early language and literacy learning experiences for their children.

The findings from this study will be used to: (a) further an understanding of the issues parents may face and assumptions they may make when trying to help their children learn to read; (b) assess the effect of RAPP as a learning tool; (c) guide future revisions to the RAPP program; (d) guide service providers in their presentation of RAPP to parents; and (e) provide supporting evidence for RAPP program expansion or compression.

A qualitative case study approach was employed to explore the research question: Does the RAPP program influence and/or change parents’ family literacy practice so they read aloud to their children more often and engage in more literacy activities with their children in the home?

Families of preschool and early primary children took part in RAPP programs that were arranged during playgroups at the Ontario Early Years Centre, Kingston and the Islands and the Better Beginnings for Kingston Children. After receiving ethics approval from Queen’s General Research Ethics Board, 21 volunteer parents or child caretakers were recruited and signed letters of consent agreeing to participate in the research. Pseudonyms were assigned to maintain the participants confidentiality to the extent possible.

Qualitative data were collected over the four month period January to April 2013 via surveys, interviews, and a focus group. The participants completed pre- and post-surveys that took approximately 10 minutes to complete. In-depth, semi-structured interviews of approximately 60 minutes were conducted with four of the parent/care-taker participants who were recommended by the RAPP facilitator. Data were also collected with four of the 21 participants via a 90 minute focus group discussion which took place at the end of the RAPP program. Again, these participants were recommended by the RAPP facilitator. The interviews and focus group were audio-recorder and transcribed verbatim. Open coding was employed to categorize the data and inductive analysis was used to search for consistencies and core meanings in the data collected through this study. An iterative process of examining and reexamining the data and revising codes was adopted until as Yin (2009) suggests a full description of the case emerged.
FINDINGS

RAPP MADE A CHANGE:

• 72% of study participants, who completed both pre- and post-program questionnaires, indicated that the RAPP program changed their reading habits with their children at home.

• 44% of these same parents rated their knowledge about how children learn to read as improved.

• A focus group parent said: “Once you’ve had even just one [RAPP] package your whole style of reading can change.”

RAPP PACK LIKE A PRESENT:

The parents described that their children recognized the RAPP packs and they got excited; it was as if they had received a present. For example, parents made the following statements:

• My son, “just gets excited every week like it’s a new book and a new craft.”

• The RAPP pack is like “a surprise for her.”

• Opening up the pack is like “opening up her weekly present.”

DIFFERENT READING

Parents reported doing reading previously with their children but they obtained new ideas about how to read differently: engaging with activities, doing labeling for their children, making connections to real life.

• “I’m not very crafty at all and I don’t think of things like that.”

• “[Reading] with a purpose…making connections, questioning, linking it to their own life experiences.”

• “It all stems from reading and labeling and you know drawing similarities…[reading in an] engaging way.”

MORE TIME READING:

• Parents reported spending more time reading: “it made it easier to do different activities with her because it’s there, it’s ready for me. I don’t have to do research and go out and be like okay here’s a book what can I do to go along with this and like it just made it a lot easier. So I guess in that aspect yeah for sure I spent more time doing that kind of thing with her.”
PATHWAYS TO EDUCATION

Partners
Wendy Wuyk, Pathways Program Director
Ellyn Clost, Researcher, Pathways
Catherine Lee, Program Facilitator, Pathways

Kingston Community Health Centre

Research Assistant
Lorraine Godden, PhD Candidate, Queen’s

This study sought to describe and understand the perceptions and knowledge of post-secondary destinations that were held by students enrolled in the Pathways to Education program. In particular, this study sought to establish whether the students’ knowledge and perceptions changed during the period when they were exposed to activities in the Pathways to Education program that were designed to increase students awareness of post-secondary choices and destinations.
COMMUNITY RESEARCH PARTNERSHIPS

DATA COLLECTION AND ANALYSIS

Participants for the questionnaires were recruited through the Pathways to Education program, 60 participants were sought, with 25 students completing the first questionnaire, and 18 completing the second identical questionnaire a few weeks later. This strategy was intended to allow the researcher to establish whether students’ perceptions and knowledge of post-secondary choices had changed following their exposure to the activities in the Pathways to Education program.

Following the first questionnaire, findings were used to inform the focus groups with 8 purposefully selected participants to allow for further qualitative exploration of Pathways to Education students knowledge and perceptions of post-secondary choices available to them. Purposeful sampling was further employed to select 7 students for in-depth interviews. This allowed for rich descriptions of students responses to the issues raised in the research questions.

The quantitative data collection and analysis comprised of the collation and comparison (where appropriate) of the sum totals of responses for each survey question. Standard qualitative analysis methods were employed to analyze the focus group and in-depth interview data, using conventional qualitative approaches of coding and thematic formation through an emerging inductive approach. Using both quantitative and qualitative collection methods allowed for an in-depth examination and triangulation of the data (Creswell, 2002).
STUDENTS’ POST-SECONDARY DESTINATIONS

When asked about their expected destinations after they had completed all education, 14 students intended to seek employment, nine full-time and five part-time. Of the 18 students who responded to this question, four intended to go to college, three university, and two apprenticeships, as detailed in the graph below. This contrasted with students’ reported intended post-secondary destinations in other parts of the questionnaire, suggesting that students were either unsure of what the question was asking them, or they were uncertain of what they intended to do after completion of all education and training.

WHO STUDENTS TALK TO ABOUT POST-SECONDARY EDUCATION

The response to this question showed clearly that students talk to more than one person regarding their post-secondary education planning. The role of Pathways to Education staff is clearly important, with 12 students recording that they talk to staff about their post-secondary education. Fifteen students reported talking to parents and guardians: it is therefore important that parents and guardians have an accurate awareness of the choices that might be available for their children. Teachers, guidance counselors and friends are also important; this suggests that students turn to different sources of advice and guidance for different purposes.

Two overarching themes emerged from the five focus groups: findings things out and moving out of my comfort zone. All of the participants reported how participating in activities through Pathways to Education had allowed them to find out more about themselves.

The theme **finding things out** included students’ finding things out about themselves, about what they were capable of doing, what their choices were, and where to get help, advice, and support.

Michael said…

*“Pathways to Education is the perfect place to try out new things, ’cause it’s about rising to new heights right?”*

The theme **moving out of my comfort zone** included seeing things from a new/different perspective, the opportunity to try things out, surprise can be positive, and needing support and guidance.

Lindsay said…

*“The shakers and Movers conference… I learned several things I did not know… that pushed me more.”*
Analysis of interview data revealed the students felt Pathways to Education were shaping their post-secondary perceptions and preparation through the following themes:

- Sense of community
- Providing scaffolding
- Opening doors
- Skills development, and
- Learning from others

Students were concerned about career planning and preparation and felt Pathways to Education were providing a critical form of support, advice, and guidance during this challenging time. In many instances, students were uncertain of choices and pathways that were available to them.

Abbi said…
“I think they [Pathways to Education] have opened a lot of opportunities for me” and “academic support when I need it…it helps you to learn organization skills and time management by coming here”

Andrew said…
“[Pathways to Education] helped me learn how to not get angry at people…I am normally a lot calmer now” and “it gives me a quiet place to do my homework…I doubt I’d be doing my homework as much at home.”

Kerry said…
“I’m doing volunteer work at an auto-shop, which is helping a lot and it’s through Pathways to Education” and “I want to become a mechanic and I’m not sure where I’m gonna go yet but…they’ll help me with what I want to do.”

The students’ perspectives shared through the questionnaires, focus groups, and interviews, reveal a number of factors that might contribute to ongoing support provided by Pathways to Education at the Kingston site.

1. Many of the students felt a level of uncertainty about their post-secondary choices and future career aspirations.
2. Pathways to Education was seen by many as a vital source of information, guidance, and support that was helpful to scaffold students through their uncertainty.
3. The sense of community provided by Pathways to Education was valued by almost all participants of this study.
4. Many students relied upon the tutoring provided to support their high-school grade performance.
5. Pathways to Education was the second most popular choice with which to discuss post-secondary education.
KINGSTON YOUTH ARTS COOPERATIVE

Kingston Youth Arts Cooperative
Margaret Bilow
Heather Zoutman

St. Patrick Catholic School, Kingston
Christian Webster

St. Patrick Catholic School, Kingston
Adam Geris

KYAC Instructors
Salar Awan
Caitlin Barton
Michael Gifford
Liam Hunt
Kyle McNeil
Imran Mouna

Queen’s University Work Study Students
Sheila Hutchinson
Carla Place

COMMUNITY RESEARCH PARTNERSHIPS

SPECIAL THANKS
Carpenter
Wayne Brown

Crossroads United Church
Debbie McCutcheon

Queen’s Con-Ed Students
Alisha Puigmarti
Vivi Shi

Research Assistant
Shireen VanBuskirk, PhD Candidate Queen’s (Education)
COMMUNITY RESEARCH PARTNERSHIPS

SUMMARY OF FINDINGS
2013 COMMUNITY RESEARCH PROJECT

KINGSTON YOUTH ARTS COOPERATIVE

The Kingston Youth Arts Cooperative (KYAC) purchased 10 robotics kits through the QCOC grant funding and hired seven instructors.

KYAC leaders and instructors facilitated the Lego robotics project in two classrooms in schools that would otherwise not have this experience, to enhance students’ engagement in STEM with the robot kits weekly from October to March. The program culminated in Lego Jam, a full day celebration of robotics activities with both schools.

The project involved a number of community partners.

DATA COLLECTION INCLUDED:

- Pre surveys for students
- Post-surveys for students
- Classroom observations of regular robotics activities
- Classroom observations of Lego Jam
- Teacher Interviews
- Student focus group

PRE- AND POST-SURVEYS SHOWED MINIMAL GAINS:
COMMUNITY RESEARCH PARTNERSHIPS

QUALITATIVE DATA ANALYSIS REVEALED THAT THE KYAC PROGRAM HELPED TEACHERS OVERCOME THREE MAIN CHALLENGES:

1. Money: The funding to purchase the robotics kits.
2. Mentoring: The professional development support to learn how to implement the robotics activities and the instructor support to ensure student support during the activities.
3. Management: Overseeing the physical equipment as well as the planning of classroom activities and integrating topics with other lessons.

“For I could watch certain groups progress and become much more confident in making the robots.” (Teacher X)

“A lot of them are quick to quit on a task… With this, it’s a situation where they can look to their neighbour for help, or they can ask the Teaching Assistants as they come around the room. But because they are going to be competing [in the Lego Jam], it’s a challenge, …they’re more apt to not give up.” (Teacher, Y)

THE KYAC PROGRAM HELPED STUDENTS IN FIVE MAIN AREAS:

1. Gained technical expertise with robotics and programming.
2. Introduced potential career opportunities.
3. Encouraged perseverance in a non-evaluative context.
4. Developing interpersonal skills with both students and adults (instructors).
5. Provided authentic context for problem solving skills.

“It kind of proved that, I guess, that we can, not to give up. If you find something challenging, don’t just give up. You can think of a way to get around it and I guess that really applies to everything in school.” (Student C)

“Now, when I grow up, I want to have something to do with hooking up with technology.” (Student A)

“I originally never really liked science. But knowing that that was science, I kind of got more interested. Because of the whole aspect that it was involving technology as well.” (Student B)

“When you think of science, you think of chemicals and all that. This was actually really fun! You’re building this, you’re programming it.” (Student B)
2014 COMMUNITY RESEARCH PARTNERSHIPS’ SUMMARY OF FINDINGS

ALPHABET SOUP IN MOTION

Anne Jackson, Kingston Literacy and Skills
Dr. Shireen VanBuskirk, RA
Dr. Nancy Dalgarno and Dr. Lynda Colgan, QCOC

The Alphabet Soup in Motion (ASM) program was developed in Manitoba with the goal of promoting fundamental literacy (reading), physical literacy, and healthy nutritional habits. The target audience in the Manitoba program was 4-year olds and their families. Kingston Literacy & Skills (KLS) was implementing the program in eastern Ontario; however, since Ontario 4-year olds are in Junior Kindergarten here, the target audience was a year younger.

The goals of the research program were to determine the strengths and weaknesses of the modified program for these participants and to make recommendations as warranted.

The three-fold approach to the program (i.e., books, physical activity, and healthy snacks) provided a multitude of access points to the programs. Some children were familiar with story-reading routines and this was an enjoyable activity; others needed the opportunity for physical activity and songs; all the children looked forward to the snack time. The fact that this program integrated all of these components (e.g., many of the books included food or physical activity references, the physical activities combined rhyme/songs with physical motions) provided connections to all three areas. Once the children who were initially reluctant to participate found a part of the program that matched their interests, they were more likely to participate in the other program components, too. There was observable difference between families where family literacy was an established routine and those where it was not. However, the parents that read to their child regularly appreciated the introduction of new, age-appropriate books. The children who were not read to regularly at home benefited from seeing how the other families interacted and modelled the activity.
ENGINEER FOR A YEAR

Maria Lahiffe, Educational Outreach Coordinator, Faculty of Engineering and Applied Science
Lorraine Gooden, RA
Dr. Nancy Dalgarno and Dr. Lynda Colgan, QCOC

This study explored how the Queen's University Faculty of Engineering and Applied Science (FEAS) Educational Outreach “Engineer for a Year” program undertaken during 2013-14, raised awareness of engineering as a career choice for elementary and secondary aged students. This mixed method case study sought to understand: (a) how did the Engineer for a Year program affect children’s perceptions of engineering-related subjects and associated careers? (b) What were the teachers’ perceptions of how the Engineer for a Year program supports their teaching practice? and, (c) How did the Engineer for a Year program facilitate collaborative curriculum implementation between FEAS engineering students and K-12 teachers?

Two observations per class were undertaken of teacher and student engineer classroom collaborations. A total of four observations were undertaken across the two participating classes. Classroom observations will focus exclusively upon interactions between teacher and engineering student.

Interviews were undertaken with participant teachers and engineering students. Purposeful sampling was used to select four participants for interview based upon findings of observational data.

All elementary and secondary students from the participating classes were invited to undertake a drawing exercise to assess their perceptions of STEM subjects and associated career choices. 16 students out of 36 participated.

The Engineer for a Year program is designed to help address the barriers to children’s engagement in Science, Technology, Engineering, and Mathematics (STEM) subjects

The target populations are youth in Grades 4-12, teachers, and Queen’s University students from engineering and education. The 2013-2014 pilot will include four teachers and their classes, and one district school board curriculum consultant with a group of teachers undertaking professional development in STEM related subjects

Through supportive and collaborative mentoring relationships, the Engineer for a Year program is designed to personalize engineering, making the profession accessible to young people through increased knowledge and confidence in STEM as a career choice
COMMUNITY RESEARCH PARTNERSHIPS

ENGINEER FOR A YEAR

OBSERVATION DATA

- Collaboration was essential for the success of the visit.
- Teacher had important role as translator
- Students were exposed to other inspirational engineers working in different areas
- Concepts covered in curriculum were bought to life
- Teacher was exposed to variety of engineering projects and networking opportunities

INTERVIEW DATA

<table>
<thead>
<tr>
<th>Teacher Themes</th>
<th>Engineering Student Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration:</strong></td>
<td><strong>Needing Support:</strong></td>
</tr>
<tr>
<td>“Engineer for a Year reinforced the value of</td>
<td>‘I’m not expert at dealing with kids because I don’t have</td>
</tr>
<tr>
<td>collaborations in schools for sure” (John)</td>
<td>that special teaching degree…his [the teacher] interactions</td>
</tr>
<tr>
<td>“It supported me as being a new teacher I</td>
<td>was really helpful to help the kids understand” (Zach)</td>
</tr>
<tr>
<td>sometimes feel that I am putting the information</td>
<td></td>
</tr>
<tr>
<td>out there and I can’t always tell if it is being</td>
<td></td>
</tr>
<tr>
<td>absorbed” (Hugh)</td>
<td></td>
</tr>
<tr>
<td><strong>Teacher as Interpreter:</strong></td>
<td><strong>Highlighting role of STEM:</strong></td>
</tr>
<tr>
<td>“Though the engineering student was technically</td>
<td>“I tried to tell them, what ever it is you are learning and</td>
</tr>
<tr>
<td>very competent, it was so important that I ensured</td>
<td>studying, it is definitely connected, and in the workplace,</td>
</tr>
<tr>
<td>the content was right for my students” (John)</td>
<td>it is used” (Zach)</td>
</tr>
<tr>
<td><strong>Expanding Student Knowledge:</strong></td>
<td><strong>Supplementing Teacher Knowledge:</strong></td>
</tr>
<tr>
<td>“It was awesome for the students to see that a</td>
<td>I looked at the curriculum and I decided, what can I apply</td>
</tr>
<tr>
<td>PhD and researcher is a human being…” (Hugh)</td>
<td>to what the teacher already knows” (Tom)</td>
</tr>
<tr>
<td><strong>Understanding my skills and knowledge:</strong></td>
<td><strong>Understanding my skills and knowledge:</strong></td>
</tr>
<tr>
<td>There are things I took for granted that I just did,</td>
<td>There are things I took for granted that I just did, but</td>
</tr>
<tr>
<td>but having to explain the process to the kids, I</td>
<td>having to explain the process to the kids, I now understand</td>
</tr>
<tr>
<td>now understand my family when they say “we don’t</td>
<td>my family when they say “we don’t understand what you</td>
</tr>
<tr>
<td>understand what you think” (Tom)</td>
<td>think” (Tom)</td>
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</table>

DRAWING EXERCISE

<table>
<thead>
<tr>
<th>Objects</th>
<th>Percent of (n=7) participants</th>
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<tbody>
<tr>
<td>Signs of thinking</td>
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<tr>
<td>Technology</td>
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</tr>
<tr>
<td>Civil structures</td>
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<tr>
<td>Blueprints</td>
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<tr>
<td>Math symbols</td>
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<tr>
<td>Furniture</td>
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<tr>
<td>Books</td>
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<tr>
<td>Other machines</td>
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</tr>
<tr>
<td>Fictional machines</td>
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<tr>
<td>Writing objects</td>
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<tr>
<td>Measuring tools</td>
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<tr>
<td>Building tools</td>
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<tr>
<td>Computers</td>
<td>10</td>
</tr>
<tr>
<td>Other people</td>
<td>0</td>
</tr>
</tbody>
</table>
COMMUNITY RESEARCH PARTNERSHIPS

IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE ITERATIONS OF ENGINEER FOR A YEAR

- Project participants need clear objectives
- Available resources should be specified to all parties
- Drawing exercise should be undertaken at commencement and culmination of project
- Engineering student requires pedagogical support – suggest involvement of experienced B.Ed. candidates
- Teachers need cover to take time out for visits to engineering faculty
- Range of possible projects should be suggested to teacher – teacher has limited time to create projects
- Matching engineering student to teacher is crucial
FINANCIAL STATEMENTS
### Financial Statements

#### April 2012-March 2013

<table>
<thead>
<tr>
<th>REVENUE</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Imperial Oil Foundation</td>
<td>$120,000</td>
</tr>
<tr>
<td>MSTE Contributions (Outreach)</td>
<td>$90,000</td>
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<tr>
<td>MSTE Contributions (Science Rendezvous 2012)</td>
<td>$5,000</td>
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<tr>
<td>Donations</td>
<td>$2,750</td>
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<tr>
<td><strong>TOTAL REVENUE</strong></td>
<td><strong>$217,750</strong></td>
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<table>
<thead>
<tr>
<th>EXPENSES</th>
<th>Amount</th>
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<tbody>
<tr>
<td><strong>Science Rendezvous</strong></td>
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</tr>
<tr>
<td>• Event Expenditures</td>
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</tr>
<tr>
<td>• Student Assistants</td>
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<tr>
<td><strong>Community Research Partnerships</strong></td>
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<tr>
<td>• 7 Funded Projects (2011-2012)</td>
<td>$65,000</td>
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<tr>
<td>• 4 Funded Projects (2012-2013)</td>
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<tr>
<td>• Printing Posters for Conference</td>
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<tr>
<td>• Poster Conference</td>
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<tr>
<td><strong>Alternate Practicum Placements</strong></td>
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<tr>
<td>• Mathakazam (Instructor, Busing, Materials)</td>
<td>$6,900</td>
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<td>• Mathematical Melodies (Instructor, Materials)</td>
<td>$3,680</td>
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<td>• Let’s Talk Science</td>
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<tr>
<td><strong>Office Expenses</strong></td>
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<tr>
<td><strong>Salaries</strong></td>
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<tr>
<td>• Acting Coordinator (Nancy Dalgarno)</td>
<td>$18,000</td>
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<tr>
<td>• Educational Researcher (Nancy Dalgarno)</td>
<td>$24,000</td>
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<td>• Coordinator (Lynda Colgan)</td>
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<td>• Office Assistant</td>
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<td>• Financial Assistants</td>
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<td>• RAs</td>
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<tr>
<td><strong>TOTAL EXPENSES</strong></td>
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</tbody>
</table>

This budget was based on information provided by Financial Services on Friday March 22, 2013 to reflect expenses and income to March 31, 2013; however, accounts to March 31, 2013 will not be closed until April 15, 2013. This may result in some discrepancies in amounts reported.
## Financial Statements

### April 2013-July 2014

**Revenue**

<table>
<thead>
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<th>Source</th>
<th>Amount</th>
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<tbody>
<tr>
<td>The Imperial Oil Foundation</td>
<td>$120,000.00</td>
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<tr>
<td>Donations</td>
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<td>First CDN Robotics</td>
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<td>NSERC grant</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>Golder Associates</td>
<td>$250.00</td>
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<tr>
<td><strong>Total Revenue</strong></td>
<td><strong>$157,930.00</strong></td>
</tr>
</tbody>
</table>

**Expenses**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Rendezvous</td>
<td>$12,372.10</td>
</tr>
<tr>
<td>Community Research Partnerships</td>
<td></td>
</tr>
<tr>
<td>• 4 Community Research Projects (2013-2014)</td>
<td>$12,983.13</td>
</tr>
<tr>
<td>Alternate Practicum Placements</td>
<td></td>
</tr>
<tr>
<td>• Mathematical Melodies (Instructor)</td>
<td>$3,600.00</td>
</tr>
<tr>
<td>• Let's Talk Science</td>
<td>$1,576.75</td>
</tr>
<tr>
<td>• Family Math</td>
<td>$72.71</td>
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<tr>
<td>NSERC PROMOScience (The Widget Workshop)</td>
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</tr>
<tr>
<td>• Student Assistance Salaries</td>
<td>$5,341.29</td>
</tr>
<tr>
<td>• Consumable Materials</td>
<td>$583.95</td>
</tr>
<tr>
<td>First Robotics Research Study</td>
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</tr>
<tr>
<td>• RA Salaries</td>
<td>$9,442.78</td>
</tr>
<tr>
<td>• Travel, Accommodation and Sustenance</td>
<td>$929.73</td>
</tr>
<tr>
<td>Administration Expenses</td>
<td>$7,919.40</td>
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<tr>
<td>Conference Presentations</td>
<td>$2,340.79</td>
</tr>
<tr>
<td>Salaries</td>
<td></td>
</tr>
<tr>
<td>• Educational Researcher (Nancy Dalgarno)</td>
<td>$30,239.93</td>
</tr>
<tr>
<td>• Coordinator (Lynda Colgan)</td>
<td>$28,540.00</td>
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<tr>
<td>• Office Assistant (Kim Garrett)</td>
<td>$9,659.24</td>
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<tr>
<td>• RAs</td>
<td>$18,308.63</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>$143,910.43</strong></td>
</tr>
</tbody>
</table>
LOOKING AHEAD...

Although our funding from The Imperial Oil Foundation has come to an end, the work of The Queen's Education Community Outreach Centre continues.

With funds from NSERC PromoScience, The Office of the Vice-Principal (Research), The Office of the Provost and support from The Rogers K-ROCK Centre and Rogers K-ROCK, The QCOC has confirmed a full suite of activities for Science Rendezvous Kingston 2015; held a sold-out professional development event for local educators and BEd teacher candidates (The Widget Workshop); updated its website to include explicit curriculum connections and grade level recommendations; participated in a city wide event called Kingston Conversations about Creating Calculating Kids; and led hands-on workshops for local teachers at district-wide professional development days on topics from Proportional Reasoning to Integrating Computers into the Kindergarten Program. Teacher candidates have been placed in settings including The Pump House Steam Museum, The Boys and Girls Club, Let’s Talk Science, The Right Angle and The Museum of Mathematics in New York for their Alternative Practica, March 23 – April 10, 2015. A full schedule of K-12 science demonstration lessons by BEd teacher candidates will be finalized for local school districts in early 2015. A program evaluation of the elementary and secondary robotics programs in schools and extracurricular settings (led by FIRSTRobotics Canada) conducted by the Director and Research Assistants from the QCOC, is poised to be released in January 2015.

In an example of a tripartite collaboration, The QCOC is working with APPSCI 100 students in The Faculty of Applied Science and Engineering to construct three original Rube Goldberg Machines for Science Rendezvous Kingston 2015. After this city-wide event, the machines will be housed at the Exploratorium at The Pump House Steam Museum to demonstrate the six classical simple machines which were defined by Renaissance scientists: lever; wheel and axle; pulley; inclined plane; wedge; and screw.

As opportunities arise, with the support of the Dean, Dr. Stephen Elliott and The Associate Dean, Dr. Rebecca Luce-Kapler, at the Faculty of Education and Tom Hewitt, Chief Development Officer in the Queen’s Office of Advancement, new proposals for funding will be developed so that The Queen's Education Community Outreach Centre can continue its important work in STEM Education.

By reaching out to adults who are parents/family members and mentors, the QCOC has worked diligently to help children change the equation: learning that STEM is about making a difference in the world. We have tried to change the equation by breaking down stereotypes—showcasing local scientists of all ages and backgrounds—women who build solar cars and green roofs and discover their own galaxies; student and octogenarian coaches working in teams to inspire young mentees to refine their robots; and, artists, musicians, and restaurateurs who are citizen scientists in their spare time, passionate about their hobbies, be they butterflies, bats or birds. These are the role models who not only convey powerful messages of STEM, but win the hearts of children by sharing their strong beliefs in relevance and shared responsibility. By bringing Science Rendezvous to Kingston, the Queen's Education Community Outreach Centre can be proud of the legacy of a much-anticipated annual public education event. The QCOC can be prouder still of the galvanized community network that it has forged over five years: one that remains deeply committed to immersing young people in hands-on STEM programs, giving visibility to STEM role models and careers, and concretizing the fact that science, technology and mathematics are at the heart of almost everything in today’s world; and, a beacon for the celebration of STEM and the future.

Per aspera ad astra.