It’s the little things...

Integration challenges

The real world: Ursula Franklin
About MSTE

Mission:

The Mathematics, Science and Technology Education Group (MSTE) is a research and development team at the Faculty of Education, Queen’s University that is dedicated to improving teaching and learning in the mathematics, science, and technology fields in schools and in teacher education.

The MSTE Group promotes:

greater awareness of the links that can be made between mathematics, science, and technology;
the advancement of accessibility to these fields; and,
education for social responsibility.

The MSTE Group is supported by an endowment fund from the Royal Bank of Canada. It is also supported by Queen’s University, and has been supported by Imperial Oil.
Editorial

I am pleased to present this Mathematics, Science, and Technology Education Group e-zine. I have the privilege of being its editor-in-chief, and the current Coordinator of this group.

The MSTE Group is soon celebrating its 25th anniversary. Much has been accomplished over the years, and more is to come. A look back recognizes the contributions of our inaugural members and their efforts to improve teaching and learning. Rereading the Ursula Franklin lecture given at one of the initial MSTE events shows that quality, progressive thinking is always engaging and thought-provoking. Hopefully, it also inspires a call to action.

This electronic magazine is such an action. Without the work of creative and managing editors, Judy Wearing and Danielle LaPointe, this e-zine would be a vague draft trapped inside my computer. For those interested in the rich history of MSTE, past MSTE newsletters developed under the guidance of Ms. Diane Lawrence can still be read. MSTE Secretary Bonnie Knox can help you find them.

Inspiring, insightful, involved, MSTE Group members’ work can be found inside these pages. From an inaugural address, descriptions of work in the community and innovative projects, products, and knowledge creation, through to the various interactions with other MST minded people – both in house and in the outside world. MSTE efforts appear year-round in the news.

I hope you enjoy your browse through these pages, and perhaps we will have the pleasure of your conversation. I look forward to hearing from you.

Yours truly,
Jamie S. Pyper, Ph.D., OCT
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The Real World of Mathematics, Science and Technology Education: The Ursula Franklin Lecture

In May 1991, a symposium about mathematics, science, and technology education was held at the Faculty of Education, Queen's University by a fledgling MSTE Group. The inaugural address was given by Ursula Franklin. An excerpt appears here, with comments from several MSTE members who were there. How much have things in mathematics, science, and technology education changed?

...What do we do now – how should we proceed in our own daily work in the field of mathematics, science and technology education? To me it seems important to reaffirm, again and again, some very basic tenets of the work.

There is the need to reaffirm the primacy of people. Whatever we do, as we teach children or adults, we must enrich the learners and must not cripple or incapacitate them. Thus, as technology becomes part of the education system, – be it as teaching instruments or as tools for knowledge transfer – the impact on people has to be conscientiously assessed. Are such tools enabling or disabling? Do they make individuals more resourceful, more self reliant, stronger and more versatile? Or do they constrain human potential? In particular, does the technological mediation of teaching and learning constrain the imagination?

...Secondly, the joy of learning must not be stifled by the efficiency of teaching. No one should miss the excitement of the elegant solution, of seeing the hitherto unseen; of recognizing patterns in what appeared random – the sense of delight that I still have (after so many years of practice) when I look through a microscope.

Thirdly, I think we must affirm the resourcefulness and resilience of people, and build teaching and learning on these attributes. Technology, not of necessity but often by design or implementation, is essentially anti-people. This was already evident at the beginning of the Industrial Revolution when factory owners would dream of machines to replace all workers...As teachers and as citizens we must be careful to recognize, celebrate and utilize the resourcefulness and resilience.
of people. Thus we must never lose the vision of education as a way for all teachers and learners alike: to think and to be thoughtful. In this light education has always been a subversive activity. I urge you to keep it this way!

To read the complete Ursula Franklin lecture and commentary, go to: http://educ.queensu.ca/mste

“The following quote caught my attention: " ...I advise especially those who are uneasy about a technology-dominated society to become competent enough not "read technology" but read between the lines...." (Franklin, 1992, p 3) ...This can be achieved through looking at the larger debates of society where politics and rhetoric come into play and where the contribution and limitations of scientific knowledge are also at play. That contest is in fact the domain of technology... Such a curriculum transcends that of the mainstream university course and is directed to ends beyond science itself. This is not an easy task. There are conserving forces at work in schools and universities that would have technology...subordinated to science and science to mathematics. These trends inhibit the educational potential of these subjects.”

John Olson, PhD
Professor Emeritus
Science Education

“Dr. Franklin’s...thoughtful address of 1991 could have been written today...
For me, the most important aspect of Dr. Franklin’s 1991 address is that it is the responsibility of educators to provide an educational environment for students “to think and be thoughtful.” This is no easy task in today’s educational environment. Dr. Franklin presses the points that “knowledge is not neutral, objective or value free” (Franklin, 1992, p. 1), that “dominant views on gender, race and ideology” (p. 1) have influenced present day knowledge – and continue to do so, and that “the teaching of science and technology will be truncated and incomplete if it does not contain discussions about why certain problems are of interest and fundable at particular points in time while other questions don’t seem to matter” (p. 1).

Dr. Ann Marie Hill, PhD
Professor
Technological Education

“All human activity has moral and political underpinnings and intentions. Our scientific and technological endeavours are motivated by notions about the world and us in it that are often not made explicit. That gets us in a lot of trouble.” Franklin reminds us to look at our hidden assumptions and intentions. She provides us with well-designed and sharpened tools—mindset, metaphor analysis, questions--for such inquiry. If we want life on earth to be increasingly peaceful and sustainable, our educators should pick up Franklin’s razor to cut through the noise and distractions of our daily lives and corporate economic and political enterprises in order that we can redirect our means of MST education to that end. Finally, we should bring to such education the cultivation of the joy of creative thinking and action.”

William Egnatoff, PhD
Associate Professor (retired)
Computers in Education

“Dr. Franklin’s presentation completed a rather remarkable collection of influences that gave definition to the nature and early direction of the MSTE group. The earlier intellectual underpinnings had come - in my version of events - from two initiatives. One, the significant work of Skip Hills and Brian McAndrews with the legendary American scholars, Philip Morrison and David Hawkins. The second, my work with the Media Lab at MIT led by Negroponte, Papert and Wiesner in the 1980s. These partnerships led to a number of visits, lectures and workshops and provided material for the creative genius of Dean Paul Park to turn into a highly successful funding appeal to Imperial Oil. The rest, with the very capable administrative leadership of inaugural Co-Ordinator John Olson, was history. The visit of Dr. Franklin can be seen as a public ‘addition’ to our high-profile roster of distinguished and wise advisors, stressing the importance of the social dimension of Science and Technology. We were, probably more than we were conscious of, setting the bar very high.

William Higginson, PhD
Associate Professor (Retired)
Mathematics Education
It’s the Little Things

Lynda Colgan stood on a big stage in Ottawa this past May to accept the prestigious National Mathematics Ambassador Award from the organization Partners in Research. The award honours “outstanding contributions of a body of work over a period of time to the field of mathematics and to Canadians and their promotion to the public by a Canadian researcher.”

I met with Lynda in her busy office, surrounded by intriguing objects of pattern and colour, to ask about the little events in her career that led to such an achievement. I was, in essence, asking her to apply the butterfly effect to her own life. Most of the events Lynda described that day were chance meetings with people who offered advice or opportunities to which Lynda said ‘yes.’

Lynda’s list of little things:

1. **Secondary to elementary:** I taught secondary math and biology for five years and I couldn’t understand why the kids were so disillusioned, why they didn’t want to learn. So I packed up and taught elementary school. That was a huge change -- being with a group of grade 5 students that were hungry to learn...It allowed me to see a learning trajectory most educators don’t get to see.

   This experience led Lynda on the career-long pursuit to make math engaging for children. One project emerging from this focus is Mathemagic, which publisher, Kids Can Press, describes as: “An introduction to the magic of math that will engage even the most math-reluctant kid.” The book has been nominated by the library guild of three provinces, and selected by the United States’ Junior Library Guild.

2. **Jim Breadner:** When I started teaching grade 5...the Scarborough Board of Education had just obtained a portable computer. They wanted to know if anybody wanted it because they didn’t know what to do with it. It was an Apple 32k with the Allen key. I said sure, we’ll take it. Jim Breadner was the computer coordinator at the time who gave me the computer and nurtured me as I tried to turn it on and learned how to work the Allen key. With the computer also came LOGO the computer program developed at MIT by Seymour Papert. Together with my grade 5 students, we had a blast...That grade 5 experience led me to become a computer consultant for the board. I then had the privilege of setting up one of the first computer labs in Ontario.
In addition to a career dedicated to engaging youth in math, Lynda used computer technology later on in her career with a program for new in-service math teachers called Connect Me, to interact online weekly with teachers to support their work.

Bill Higginson: [The computer lab] led me to meet Bill Higginson, who suggested I do some graduate work...I did start those graduate courses and [went] on to do my Ph.D. One day a colleague of mine said, “you know the math coordinator position is going to be posted soon.” “That I couldn’t do, I’ve never been a department head.” I applied and got the job and was terrified.

Years later, Bill Higginson, a retired MSTE member, was here at Queen’s to ‘greet’ Lynda when she got the job in the Faculty of Education in 1999. Bill introduced Lynda to Steve Lukits, who hired her to write a full page column about math in the real world every two weeks for the Kingston Whig Standard. A reader in Kingston collected these columns and took them to TVO, who ultimately decided to make The Prime Radicals T.V. program. Check out the website and apps at www.tvokids.com/shows/primeradicals.

Lorna Earl: [As math coordinator] I was given the chance to work with Lorna Earl, one of the world’s leading experts in assessment and evaluation...Lorna and I developed an assessment for grade 3 and grade 6 mathematics and that assessment was a very different looking assessment from the standpoint that it had multiple choice questions, and short answer questions, but it also had hands-on activities so that teachers could sit with students as they used pieces of string, blocks and tiles to do tasks and describe their actions.

“The word assess comes from the Latin assidere, which means to sit beside. Literally, then, to assess means to sit beside the learner.”

-Evangeline Harris Stefanakis (2002)
Lynda and Lorna’s math assessment work grew into the first provincial assessment of mathematics for Ontario. It also led to publications that caught the eye of Rena Upitus, Dean of Queen’s Faculty of Education in 1999, who made Lynda aware of the available academic position in mathematics.

Margaret Fler: Here [at Queen’s] I ran into Margaret Fler, who I’d gone to high school with. We sat beside each other in math class. She is now working in the parent division at EQAO. She asked me if I’d like to do some parent workshops, I said sure, and that has turned into parent workshops across the province, and now this massive project with CODE that came out of the blue.

The CODE [Council of Ontario Directors in Education] project entails a $500,000 grant to produce a parent engagement package to support parents as they support their children in math. A series of videos and support materials are being produced for wide dissemination among Ontario families.

Tom Russell: An email said, “you might find an article in this morning’s Globe interesting. There was a science festival in Toronto on the weekend.” That was the first Science Rendezvous and I read it and decided: we need that in Kingston.

Tom’s email to Lynda in 2010 led to the first Kingston Science Rendezvous in 2011, featuring 25 displays and attracting 500-600 people. In 2014, the annual event had grown to host 60 displays and attract 3700 people.

It’s the little things in life—the little decisions, the opportunities followed, the people who sat beside us in math class, the emails we read—that make all the difference.
“How do we, as a community, help our children succeed in Mathematics?” asked two Faculty of Education students – alumna Dianne LaFortune and current M.Ed. student, Dustin Garrett.

They organized a Kingston community event October 2nd, 2014 to find out, and share these findings. After a presentation by the Lego League, parents listened to Lynda Colgan give a keynote on mathematics and a panel discussion followed. Children, meanwhile, participated in math workshops involving music, cooking, games, and robots. Dinner and childcare were provided. The event was sponsored by The Algonquin and Lakeshore Catholic District School Board and the Ministry of Education.
Frontenac, Lennox and Addington Science Fair: Two hundred and thirty students from 23 schools participated in the 43rd annual science fair in 2014, held in the Faculty of Education at Queen’s University gymnasium. Of 180 projects at the fair prepared by grade five to twelve students, six presentations focused on the theme of Energy. A record number of judges also took part in the fair, including many final year and concurrent year B.Ed. teacher candidates.

Johnny Biosphere Environmental Education Fund:

Teacher candidate Karri Berg organized a workshop on Storytelling, a pedagogical tool, led by professional storyteller Deborah DunLeavy and attended by 44 of Karri’s peers. Participants explored storytelling as a means to share information, inspire action and influence values, morals, and attitudes. The goal: to create environmental and cultural awareness. Deborah incorporated stories told from an indigenous perspective and addressed sensitivity and appropriateness when telling stories from another culture.

Teacher candidate Robert Coffey used a Johnny Biosphere grant to help Sharon Public School plant thirty cedar trees around their outdoor education classroom. On a sunny day in June, forty grade 3 and 6 students, three teachers, and Robert had some fun in the dirt while greening their school ground. Before planting, the landscape manager from Stilescape explained the kinds of cedars to be grown and how to plant them to ensure survival. The students took personal responsibility for the project. Some students made comments about wanting to plant even more trees in the schoolyard and at their homes as a result of the experience.

The Johnny Biosphere Environmental Education Fund was established through an initial gift of $10,000 made to Queen’s University by the family of Dr. Jack Vallentyne, B.A. 1949 (Queen’s), Ph.D. (Yale), a professor in the Faculty of Arts and Science, Department of Biology from 1952 to 1958. Dr. Vallentyne was also a prominent research scientist and environmental activist. In his persona of "Johnny Biosphere", Dr. Vallentyne appeared before thousands of school children, teachers, and environmental groups all over the world. His message was simple and direct: What we do affects the Earth; what the Earth does affects us. This sentiment was reflected in the purpose of the fund as directed by the family: “to promote environmental awareness among children.”
For so many, mathematics is a set of fixed rules and procedures. With this view direct instruction makes sense: why ask students to be creative when there is nothing to create? But mathematics is not a finished story. It is an unending narrative that grows through collective human exploration. The web site Math-Towers (www.math-towers.ca) poses puzzles for students in grades 6-10, but does not provide answers. Students instead climb towers and build solutions to the puzzles while reaching new heights of understanding through creative and collaborative problem-solving.

What makes Math-Towers different?

There are millions of math websites. Most either provide direct instruction in skills—how to do long division, for example—or give an interesting problem and its solution. These sites are helpful for learning technique. Math-Towers requires technique, but beyond that engages students in mathematical thinking. Engage is a key word; students working with Math-Towers are engaged. They're collaborating, they're challenged, they're being creative.

How does it work?

Math-Towers provides students with tools to investigate a problem and an online space for collaboration while building a solution. When a class first enters Math-Towers, they meet the Lord or Lady of the castle who presents them with a rich problem that cannot be solved by mechanical procedures alone. Student companions on their quest enter a tower where there is a lab equipped with mathematical tools to support exploration of the puzzle. They also find a scroll for recording and sharing their observations and suggestions. Classmate companions provide feedback and advice to help each other climb the tower. Together, through investigations, conjecturing, and testing, the class builds a solution. Finally, on the tower ramparts they are joined by the Lord or Lady of the castle who puts their new knowledge to the test.

What do students get from the Math-Towers approach?

The mathematical tasks presented in Math-Towers are complex enough that a class is likely to require a number of hours constructing a solution. All student work can be saved and accessed over a number of days as the class, step-by-step, advances towards a solution. In experiencing this process, students get a sense of mathematics as it was and continues to be: built over time, with some problems taking centuries and the efforts of many people before a solution is developed. In the meantime, students also learn and apply mathematical techniques in a rich, meaningful, and engaging way. Of course, their experience of collaborative problem-solving extends well beyond the realm of castles and towers.

For more information see www.math-towers.ca and the MSTE website at: http://educ.queensu.ca/mste
Holly Ogden leads a pilot program unique to Queen’s that entails cross-curriculum courses for Primary/Junior teacher candidates. These courses approach the teaching of Math, Language Arts, Fine Arts, and Science & Technology or Social Studies in an integrated fashion, just as teachers in many Primary/Junior classrooms do. I asked Holly Ogden to share her wisdom about three key challenges in integration and what to do about them.

“What do fruit salad, math, and music have in common? In Holly Ogden’s class, teacher candidates learn the fruit salad round song, as well as how to apply it to math and science.

by Holly Ogden
1: Integration or Cross-curricular?!?
There are many different and sometimes conflicting definitions and ideas about integrated curriculum.

What to do about it: Curriculum integration is more than overlapping existing subjects (it’s not reading about climate change or calculating the accumulated rain fall over a month in math). Integrating the curriculum requires learners to access knowledge from various traditional subjects without labelling them as such, and incorporates critical thinking, and real-world applications.

It is a terrific partner for inquiry-based learning. Rather than asking students to follow steps, memorize or, put them in the driver’s seat and guide them as they work together to discover knowledge and then apply their knowledge as they solve real world problems.

2: It’s overwhelming!
There are many, many curriculum expectations to cover and assess in an elementary classroom.

What to do about it: Scan the overall expectations across all subject areas and cluster. It’s okay to start small and cluster two subjects (math and social studies, science and language, health and drama). Everything doesn’t need to and shouldn’t be integrated. The focus of curriculum integration should be designing learning that is meaningful and that challenges learners to solve real problems. Plan using the backwards design method. Formulate one critical question and consider the culminating task(s). Think real world! Pick an issue or theme that is meaningful to the learners, that they will really want to sink their teeth into, and think about all the ways that the issue connects to critical literacy, media literacy, math, technology, science, citizenship, families, health, geography, etc.

3: Scheduling!
Thinking across traditional curricular boundaries, and beyond established timetables and ways of organizing learning, can be challenging when the school system is designed to teach discrete subjects.

What to do about it: Schedule large blocks for your integrated topic. Don’t think of or label these blocks of time as discrete subject areas but rather set aside this time to work on the critical question(s).
Play-Based Kindergarten

Carolyn DeGroot and Tara Parsons from Perth Road Public School were guest speakers in five Primary/Junior science and technology teacher candidate classes taught by Diane Lawrence. Students received a realistic overview of the differences between the “old” model of Kindergarten program and the new play-based program. Activity centres with photographs of actual Kindergarten activities and materials allowed teacher candidates the opportunity to explore learning expectations for Kindergarten, and identify them in action. Students were interested in assessment in a play-based program, which led to excellent discussions and examples. Carolyn and Tara graciously shared many resources through the course website.

Feedback on microteaching

Richard Reeve and Terry Bridges asked grade 7/8 teachers Scott Baker, Rideau Public School, and Nabil Mailloux, Module de l’Acadie, to lead critiques of teacher candidates’ micro-teaching: teaching a small part of a lesson they had developed. Positive formative feedback improved the lessons, and helped adapt them for the real classroom. Reeve and Bridges met with Baker and Mailloux after class to debrief and discuss current Limestone District School Board initiatives in science and technology and teacher professional development. The visit thus impacted the teaching of both the teacher candidates, and the Faculty of Education instructors. “A very important part of the course,” stated one student participant. “The opportunity to work collaboratively with the Faculty of Education... allows for an open exchange of ideas and current practices which can only have the effect of better preparing new teachers, inspiring experienced teachers, and as a consequence providing our students with better opportunities for success,” said Scott Baker.
Blended learning in high school science

Tim Pendergast, science teacher and department head at Holy Cross Secondary School, visited Terry Bridge’s Intermediate/Senior teacher candidates to share how he has evolved as a science teacher over his twenty-year career from teacher-centred to student-centred instructional practice. He talked about his use of technology in all aspects of his teaching, his experience as a science department head, and the blended learning initiative at Holy Cross. Subsequently, teacher candidates visited Holy Cross to see online work and projects being done in grade 9 and 10 classes. In a debriefing session, Queen’s students shared their thoughts with Pendergast and the teachers whose classes they’d appreciated. “I saw that with the student-led activity, the students were able to create their own hooks! If they needed to see something cool before starting up, they had the freedom to do so.” Teacher candidate

Expert Panel on Teaching Science and Technology

Sandy Youmans arranged for 100 Primary/Junior teacher candidates to hear from a panel of four visiting educators with a variety of backgrounds in science and technology instruction. Expertise ranged from outdoor education to early childhood education to technology integration. Expert panelists were given questions formulated by teacher candidates ahead of time, and commented on the thoughtfulness of teacher candidates’ questions. They answered honestly and practically.
It was our school’s first year being involved and we’re glad we were! The students enjoyed their day and the opportunity to have enrichment in the field of mathematics.

MathOlymPlcs

“I <3 math” said the badge on the chests of the grade seven and eight students from 31 schools who participated in the 2014 Math Olympics at the Faculty of Education at Queen’s University. The annual spring event challenges teams of students to a range of problems requiring creative solutions with the promise of prizes for 1st, 2nd, and 3rd place team members, as well as pizza, snacks, and certificates for all.

Putting on the all-day event requires a massive amount of energy, supplied this year by 150 Primary/ Junior teacher candidates and 67 Intermediate/Senior candidates, as well as parents, teachers, and faculty who volunteered their time and expertise. Organization of the event is made possible through the unique program at Queen’s Faculty of Education, the Alternative Practicum, which gives teacher candidates the opportunity to participate in education experiences outside the traditional classroom. This year’s five “Alt Prac” students – Julie Campbell, Sonja Costa, Angie Hwang, Clarissa Parson, and Joy Tay—were responsible for coming up with the cool numeral-inspired badges.

The 2014 winning teams are:

First Place: Calvin Park
Teacher: Ms. Metzger
Students: Donna Gao
Aidan Lawford-Wickham
Nisha Gill
Matthew Wilson

Second Place (and booklet winner): St Martha Catholic
Teacher: Ms. McLeod
Students: Jacob MacDonald
Bryn Reynolds
Holly Crowson
Ryan Ralph

Third Place: Loughborough Elementary School
Teacher: Mr. McCardy
Students: Adam Hull
Ray Whitehead
Hope Plumridge
Aurora Black
‘Win-win’ is a cliché that applies well to the annual Science Discovery Day. February marked the 24th year that hundreds of parents and students flocked to the gym at the Faculty of Education, Queen’s University to participate in 75 hands-on science and technology activities. Science is fun, as anyone knows who’s attended Science Discovery Day and modelled a volcano with baking soda and vinegar or made a human intestine with old nylons.

The benefits of this event go well beyond the few hours of pleasure such exposure to science and technology gives the community. Science Discovery Day provides more than a hundred Primary/Junior teacher candidates with invaluable experience. They develop learning activities that bring science to life and interact with parents and students of varying ages.

Science Discovery Day has a significant impact on subsequent teaching and learning. Teams of teacher candidates take their activities out into community schools as part of an outreach program. Perhaps, most importantly, many of these future teachers will continue to teach science in a hands-on, meaningful way for years to come.

The faculty members who teach the Primary/Junior teacher candidate program -- Diane Lawrence, Richard Reeve, and Azza Sharkawy -- say thank you to all who participated.

See you in 2015 for the 25th anniversary Science Discovery Day!
Keynote Egan Chernoff kicked off this day long event for math educators with the question: “Is the Western Initiative for Strengthening Education in Math (WISE) actually strengthening education in math?” Then, workshops for Quinte St. Lawrence Math Association members and non-members included: an inclusive approach to MathOlymPIcs that turn it from contest to collaboration; destreaming Grade 9 mathematics; the power of computer technology for visualizing math concepts; and, gizmos – online simulations that can enhance math instruction.

For futures events, check the QSLMA website: http://chapters.oame.on.ca/qslma/author/qslma/
Dr. Egan Chernoff from the University of Saskatchewan demonstrated his use of social media for mathematics education to teacher candidates, graduate students and faculty. He introduced us to MatthewMaddux, the identity created by Chernoff when he created a professional Facebook account. (Read the name quickly.) MatthewMaddux is now in the Twitterverse as well as Google+, Tumblr, Delicious, and more. Chernoff's main goal for social media is to share information, rather than build community or engage in conversation. Chernoff is anything but asocial; however, he has made the choice to be asocial online. He doesn't follow anyone on Twitter, and he doesn't post about what he had for lunch. He is a “digital curator” for mathematics education with a repository for online information on Tumblr, and a microblogging platform. He posts between fifty and a hundred times per month on his blog MatthewMaddux Education. Check it out at www.matthewmadduxeducation.com, or www.eganchermoff.com.

Dr. Barry Kluger-Bell is an independent science consultant who worked with David Hawkins, an internationally renowned philosopher of science and science educator. Dr. Kluger-Bell introduced teacher candidates to a Hawkins’ perspective on elementary science education that emphasizes the opportunity to “mess about” or interact directly with materials. This stimulates students’ curiosity and self-directed inquiries. Kluger-Bell’s workshops for Primary/Junior science teacher candidates began with a rotation through four stations that provided participants with some time to “mess about” and identify questions to explore further.

Dr. Garry Hoban, Associate Professor in the Faculty of Education at the University of Wollongong in New South Wales, Australia added a stop in Queen’s to his world tour. In a faculty seminar, Garry demonstrated a range of resources and techniques from theoretical perspectives to practical tips for science education. Garry worked with physics teacher candidates to introduce the use of Slowmation and DigiExplanations in their education work. [Student quote]“I love the idea of having students teach themselves and peers subject matter.”
To acknowledge the importance of encouraging a cadre of doctoral scholars in the field, MSTE annually offers a scholarship to an outstanding research candidate. The MSTE fellows for 2013/2014 and 2014/2015 are Meghan Dale and Paul Godden, respectively.

Meghan Dale has worked at Statistics Canada as an analyst in the Education Department, where her job was to make sense of postsecondary survey data. Her twin passions are cognitive development and mathematics. For Meghan, math is an equalizer. It’s logical, universal (mostly), and has a lot of romance. The appeal of logic and romance is illustrated nicely by the poster hanging above her desk: The Periodic Table of Imaginary Elements. Meghan is particularly fascinated by how young children make the transition from rudimentary understanding of numbers and math to the adult structure of math. Hence the focus of her research – what educators understand about that process in their students and how they facilitate that transition effectively.

Paul Godden is a behavioural ecologist by training, an ex-British safari park keeper and IT consultant, and a newly official Canadian citizen. His research focuses on controversial issues in science—where a consensus of scientists agree but the public and some educators find the topics deeply polarizing (e.g., evolution vs. creationism, anthropogenic global warming). The MSTE award has not only recognized the value of his research, but has allowed him, as a mature grad-student with a family, to continue his studies and keep his children in winter clothes.
To provide opportunities for doctoral students to gain depth and breadth of experience in MSTE-focused issues, MSTE offers a scholarship to promote leadership, organization, and professional community building in the MSTE context. The MSTE apprentices for 2013/2014 and 2014/2015 are Danielle LaPointe and Judy Wearing, respectively.

Danielle LaPointe (Queen’s B.A., Hons., 1993; B.Ed., 1995) is a closet creative who does exceedingly practical work, a paradox that suited her well in her fifteen year teaching career in math and special education. She is currently in her 2nd year of her PhD exploring supporting formative assessment of math educator practice through classroom video analysis, a method inspired by a budding movie director, her ten year old daughter Claire. As the MSTE Apprentice 2013-2014, Danielle has put her firm belief that research, learning, and fun should co-exist to the test with a variety of projects including working with Jamie Pyper on research focused on pre- and in-service teacher efficacy in math, which she continues to do. She also spearheaded the organization of math-related resources housed in the Faculty and contributes to the ongoing organization of MSTE events and activities, including this e-zine.

Judy Wearing has avoided categorization by entertaining a variety of careers such as: evolutionary biologist, multimedia project manager, director with an education not-for-profit, editor with an educational publisher, and freelance curriculum developer. She’s finally found her calling in education scholarship, researching the pedagogy of creative and critical thinking, though she still midnights as a popular science writer and baker of metaphorical cupcakes. As the 2014-2015 MSTE Apprentice, Judy is focused on communicating and coordinating MSTE events and activities, including this e-zine, an MSTE web presence, and the upcoming MSTE anniversary celebration.
Retirement

George “Skip” Hills,

Professor of Science Education, retired in 2014.

The following tribute was written by his colleague, William Higginson

During my long tenure in the Faculty of Education I held a somewhat unorthodox view of what constituted an ideal faculty member. Such a Janus-like paragon could, in my view, thrive simultaneously in two quite distinct environments. One being the intellectual combat zone of the research raptors (read ‘mano à mano - or mens à mens with main campus departmental colleagues) and the other being the sweaty, quotidian reality of public school classrooms (read Grade 9 Tech Class on Friday afternoon). Hence, a tortured image of a magical beast capable of soaring with eagles and swimming with fishes – not an easy act to bring off. Of all my colleagues over a forty-year span I think none came closer to realizing this gold standard than Skip Hills. More than capable of contributing to the cuts and thrusts of academe (cf. his contribution to An Image of the Whole: Knowledge and Curriculum in an Age of Fragmentation; W. Higginson, Ed. Kingston: Faculty of Education, 1978) he was also widely respected by both practicing teachers and teacher candidates (as reflected, for example, in the fine ‘Science Club’ work he carried out over many years with his close friend Brian McAndrews). His patience, humility and humour were always much appreciated by colleagues and students alike. Thanks ‘George’, it was a blast.

(William Higginson, Mathematics Education, 1973 - 2010)
MSTE Current Members

Jamie Pyper, Coordinator
PhD (OISE/UofT)
Assistant Professor of Mathematics Education,

Richard Reeve, Executive
PhD (OISE/Toronto)
Assistant Professor, Information and Communication Technology, Learning in Education

Cathy Christie
PhD (Queen’s)
Associate professor of science education

Diane Lawrence
MEd(Queen’s)
Associate Professor of Elementary Science Education

Peter Taylor
PhD (Harvard)
Cross-appointment, Department of Mathematics and Statistics

Joan McDuff, Executive
MEd (Queen’s)
Lecturer in Elementary Mathematics

Peter Chin PhD (British Columbia)
Associate Dean Undergraduate Studies
Associate Professor
Coordinator of Practicum, Coordinator of Technological Education

Lynda Colgan PhD (OISE/Toronto)
Associate Professor of Elementary Mathematics Education,
Coordinator of Education Community Outreach Centre

Tom Russell
PhD (Toronto)
Professor of Science Education and Teacher Development

Ann Marie Hill, Executive
PhD (Ohio State)
Professor of Technological Education

Azza Sharkawy
PhD (OISE/Toronto)
Associate Professor of Elementary Science Education

Bonnie Knox, Secretary

Associate Members

Terry Bridges PhD (Queen’s)
PhD Candidate

Holly Ogden PhD (Queen’s)
Lecturer P/J Clusters Science, Mathematics, Technology

Barbara Canton
Adjunct Faculty

Stephen Haberer
Adjunct Faculty

Ena Holtermann
Lecturer

Wendy Powley PhD
Adjunct Faculty

Retired Active Members

Geoff Roulet PhD
### December
- TBA Hour of Code, Kingston schools
- 6 EQAO Parent Forum, Markham
- 13 Widget Workshop, Queen’s

### March
- 7 EQAO Parent Forum, Ottawa
- 26-27 Frontenac, Lennox and Addington Science Fair

### April
- 9 Grade 9 Math Mash-Up, Queens
- 24 MathOlymPlcs, Queen’s
- TBA Animals in Science Education workshop, Philosophy Dept., Queen’s
- TBA Provincial Parent Involvement Conference, Ministry of Education
January

31 Science Discovery Day, Queen's

May

9 Science Rendezvous, Kingston

October

31 Johnny Biosphere Grant application due