MSTE 25th Anniversary!

The Nature of Illumination

Importance of Digital Leadership
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.
Welcome to the MSTE e-zine! I have the privilege of being the current Coordinator of this group of mathematics, science, and technology education minded researchers and practitioners, and to be able to bring this year's e-zine to you. Twenty-five years ago was a pivotal time for many people, and especially for the Faculty of Education at Queen's University. Along with the many other activities and projects from the MSTE members, the 25th anniversary event is showcased in this edition.

The mission of the MSTE Group is to improve teaching and learning in the mathematics, science and technology fields in schools and in teacher education. Over the past year we have worked on a number of events and projects that further those goals. The MSTE Group supports external organizations' efforts as well as our own members' efforts. For example, the Frontenac Lennox Addington Science Fair, the Science Discovery Day, and the MSTE-QSLMA 7&8 matholymPics are a few of these events. The MSTE members also collaborate with local educators having them visit us and work with our preservice and graduate students. Every once in a while we have a chance to showcase the work of a visiting scholar. For example, this year Dr. Peter Liljedahl from Simon Fraser University gave a talk on creativity and 'illumination'.

The MSTE Group and its members’ work can be found inside these pages. The MSTE Group offers diverse perspectives on issues that are important to its members, and this diversity can be seen inside this e-zine, from descriptions of work in the community and innovative projects, products, and knowledge creation, through to the various interactions with other MSTE-minded people.

Special thanks goes to the current MSTE Apprentice, Heather Braund (M.Ed. candidate) for her wonderful and tireless work putting this e-zine together. For the historians amongst the readership, past paper-based MSTE Newsletters under the guidance of Ms. Diane Lawrence can still be read. A phone call or email to the MSTE Secretary will help you find access to them.

Welcome to the MSTE 2016 e-zine. I hope you enjoy your browse through these pages, and perhaps we will have the pleasure of conversation and communication from you. I look forward to hearing from you.

Yours truly,

Jamie S. Pyper, Ph.D., OCT.,
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Math Challenge for QLSMA:

On April 16th, 2015 the Quinte St. Lawrence Math Association (QSLMA) and MSTE group sponsored a math challenge for Grade 9 and 10 students. The evening was an event where teams of 3 students worked together to co-operatively answer up to 20 questions within the allocated 45-minute time limit. Teams were comprised of students from the same grade. Points were awarded for each question and then teams were presented with prizes. The top three teams in each grade received a medal as well as a bag of prizes; the other teams also received a bag with prizes for each participant.

Frontenac, Lennox, and Addington Science Fair (FLASF):

On March 26 and 27th 2015 the Frontenac, Lennox, and Addington Science Fair was hosted at Queen’s Faculty of Education with financial support from the MSTE group. This was the second largest science fair to be held at McArthur Hall since the event began its tenure here in the ‘90’s. 275 students presented 213 projects from 26 area schools this year. As has been the trend since the new curriculum guidelines came out in the late ‘90’s, most of the projects were submitted in the Primary (grade 5-6) and Junior (grade 7-8) categories. Open judging and special awards judging took place on Thursday evening, and best of fair judging was on Friday morning. Science workshops were held Friday morning for participating science fair students as well as visiting groups of students from local classrooms. This year the theme of “Environment” resulted in four workshop presentations and a full group presentation — all aimed at encouraging student investigation skills and personal impact. Student response was very positive, and the projects were spectacular!
Exploring Project for Enhancing Effective Learning:

The funds provided by the MSTE group supported the visit of Dr. Ian Mitchell of Monash University (Melbourne, Australia) from April 15th-17th, 2015. Dr. Mitchell was the central figure in the founding of the Project for Enhancing Effective Learning in 1985. Dr. Mitchell began his visit by attending a physics class at Loyalist Collegiate and Vocational Institute here in Kingston. At Queen's Faculty of Education, Dr. Mitchell spoke with intermediate-senior teacher candidates in the Physics curriculum class about the PEEL database (http://peelweb.org) and introduced the class to recently developed insights into planning practices of experienced teachers. Dr. Mitchell also presented insights from PEEL at a guest lecture for teacher candidates and graduate students with interests in the sciences. On April 17th, Dr. Mitchell offered a seminar to all faculty members; the seminar was video-recorded and made available through the MSTE group. This visit allowed teacher candidates in science and faculty members to interact with Dr. Mitchell and engage in meaningful conversations about using the PEEL database to support student learning in science.

Early Years Science Integration:

On April 15th-17th 2015, guest speakers Amanda Aylesworth (Full Day Kindergarten Teacher) and Pennie Hilliard (ECE assistant) from Perth Road Public School were invited to speak to primary-junior teacher candidates in science and technology education courses. Amanda and Pennie were wonderful advocates of the new play-based Kindergarten program. Teacher candidates had the opportunity to see what a full day kindergarten classroom looks like (via a video produced in Amanda’s classroom) and then had an opportunity to learn the practicalities of meeting and assessing ministry expectations through the creation and assessment of learning centres of their own. 240 teacher candidates had the opportunity to participate—and judging by their attention and the number of questions during and after the planned activity, the presentation was very worthwhile. A straw poll indicated that only a third of TCs present had had an opportunity to be in or associate with a full day kindergarten on their school placement, making this endeavour even more meaningful.
On Thursday November 5, Dr. Peter Liljedahl, Associate Professor, Faculty of Education, Co-Director, David Wheeler Institute for Research in Mathematics Education at Simon Fraser University, British Columbia gave a talk to faculty and graduate students on the nature of illumination and its relationship to creativity. A lively discussion rounded out the event. All attendees coming from a variety of disciplines found something engaging and informative.

“What is the nature of illumination? That is, what is it that sets illumination apart from other experiences? In this presentation the answer to this question was pursued through the use of historical and contemporary theories of discovery, creativity, and invention to analyze the qualitative experiences of prominent research mathematicians.”
Integrating ICT in Elementary Science Education:

In February 2015, Joanne Borges, who at the time was a Connected Technology Teacher with the Limestone District School Board, facilitated a workshop for three sections of our PJ Teacher Candidates, on the integration of ICT (Information Communication Technology) in elementary science education. Joanne discussed the important role teachers can play in facilitating students’ digital literacy, citizenship and fluency. She also emphasized the importance of thoughtfully integrating ICT in curriculum in a way that enriches and deepens student learning. After modelling the use of several apps, Joanne provided students with ample “hands-on time” to try them out themselves. To assist Teacher Candidates in their independent explorations, Joanne designed a handout that listed each of the apps and how they can be purposefully integrated in the science classroom.

School Grounds as Learning Grounds:

On November 26th, 2014 Cam Collyer, Director of Education, Evergreen Foundation of Canada was invited to present his work at the Evergreen Foundation. This organization supports communities and boards of education in their efforts to create naturalized learning grounds around their schools. Cam is also a graduate of the Queen’s Bachelor of Education program so his visit provides a wonderful opportunity for teacher candidates to appreciate the variety of career options their B.Ed. degree can provide them. Teacher candidates in the Technological Education Program, Outdoor and Experiential Program, Artists in the Community Program, and Environmental Education Focus tracks attended the presentation alongside concurrent education and graduate students. Cam gave his audience practical examples of school ground naturalization projects across the country and beyond. More importantly, was how he talked about the philosophy and rationale for such projects, the academic, physical, emotional, and physiological benefits outdoor learning spaces can provide. As a result of the diverse audience, Cam also demonstrated the connection between art, environment, and technology.
Saturday October 3rd, 2015 was the date for the anniversary celebration. We had some exciting activities for everyone’s listening pleasure, watching enjoyment, and participation!

George Hart (georgehart.com) started the day telling us about the wonders of mathematics, science, technology, and engineering as an art form through sculpture design and creation.

Twenty-five participants as a team worked with George to put together a commemorative anniversary sculpture for us! It is called “Volcanoes”, and consists of twelve conical openings. It is made of sixty identical laser-cut wood components and 180 cable ties. Each wooden component is planar and meets with six other components. One end of any piece is part of an outer cone while the other end of the piece is part of an inner cone of an adjacent volcano. See http://georgehart.com/sculpture/Volcanoes/volcanoes.html for a trip through the event.
This sculpture represents the natural interaction of elements that create an often complex structure of something powerful, beautiful, and engaging. As a metaphor for teaching and learning, it has interpretive opportunities as expressions of the relationships between teacher and learner, the learner and what is being learned, and (to use complexity theory) the dynamic and stable characteristics of learning environments/situations/contexts. The sculpture also expresses a sense of an underlying integration of mathematics, science, and technology education through an aesthetic lens.

Participants then worked individually or in teams of three or four to create prototype paper airplanes with 8 ½ × 11-inch paper. They then scaled up to a larger format of paper — Bristol board, and tested in our obstacle course! Obstacles tested the airplane designs with wind, corners, holes in barriers, and swinging pendulums! The ultimate challenge was a flight and accuracy test — paper airplanes were thrown from the balcony of the auditorium to two hoola-hoops lying on the stage.
Finally, to end the day with humour and a challenge to each and every one of us to continue to work hard to think critically about sustainability, and care for the world in which we live, Bob McDonald of CBC’s Quirks and Quarks gave a presentation! The connections of mathematics, science, and technology all come together in education, so wonderfully illustrated in his examples. What great points for us all to remember as we move forward in this world of ours, and help us learn more and improve our efforts to make it a better place.
A new event was started this year, the MSTE Grade 9MathMashup. A B.Ed. Alternative Practicum team of teacher candidates created the events, organized the day, and ran the event. This year the Alternative Practicum team consisted of three Intermediate/Senior teacher candidates; Mackenzie Ash, Stephen MacGregor, and Steven Whalley, under Dr. Jamie Pyper’s supervision. A group of senior-grade ‘mathletes’ from a nearby secondary school also came for the day and acted as event managers. They arrived earlier in the morning to receive training on the events before the grade 9 students arrived.

Three schools participated, sending approximately twenty students from their grade 9 applied math classes to the Faculty of Education on Thursday April 7. The theme of the Mashup was inspired by a current and popular movie, the Maze Runner. Three rooms were designed with a particular event that when completed, would give the teams points to use on the final event to answer the puzzle at the centre of the maze. The three rooms consisted of a) an obstacle course in which motion sensors and graphing calculators were used to find the total distance from start to end, b) a cipher that was solved by completing a matrix of problems, and c) a three-dimensional building and path task. The final task was a puzzle of letters and graphics that represented a phrase – however the puzzle was covered by panels. The scores from the three event rooms indicated how many panels could be uncovered.
It was a very successful event. The exit survey indicated an overwhelming positive response from the students. Often grade 9 students who struggle with mathematics do not have many opportunities to see how thinking mathematically can be a part of an exciting and fun set of tasks. They clearly told us that this was a worthwhile event.
The annual grade 7 and 8 math Olympics event occurred on Wednesday April 23, 2014. This is a joint event between the MSTE Group and the Quinte St. Lawrence Mathematics Association (QSLMA), financially supported by event registration fees and the MSTE Group. Annually a B.Ed. Alternative Practicum team of preservice teachers creates the events, organizes the day, and runs the event. This year the Alternative Practicum team consisted of five Intermediate/Senior preservice teachers; Emily Hamilton, Pranay Khanna, Jason LeBlanc, April Soo, and Emma Van Esbroeck, under Dr. Jamie Pyper’s supervision.

This year twenty teams from the surrounding area participated. At registration, each team receives a ‘Booklet of problems’ that can be completed as a team throughout the day. A prize is awarded at the end of the day for the team who has the highest score from the Booklet problems. The day continues with four twenty-minute events, a pizza lunch, and then two thirty-minute events. Scores are tallied at the end and medals handed out to the top three teams, and there is a trophy for the top school for the year.

This event requires a lot of help and support. There were approximately 100 Primary/Junior preservice teachers and 30 Intermediate/Senior preservice teachers who volunteered for various tasks throughout the day. These tasks included set-up, registration, managing events, scoring, lunch, and clean up. Mrs. Joan McDuff was instrumental throughout the Alt Prac with materials and encouragement and advice support.
The 2015 winning teams are:

**First Place**

*Module de l’Acadie*
Leah BLANCHER
Jake KNUTSSON
Alicia HENDERSON
Daniel ZHANG

**Second Place**

*Brockville Collegiate Institute*
Shuja SAYYID
Christina BI
Brenden LOCKETT
Prutha PATEL

**Third Place**

*Odessa Public School*
Cassandra PRYTULKA
Alexander LI
Lauren DOWLING
Callum LEVETT

**Honourable Mentions**

*Saint Marguerite Bourgeoys C.S.*
and
*Module Vanier*

**Booklet Winner**

*Module de l’Acadie*
Leah BLANCHER
Jake KNUTSSON
Alicia HENDERSON
Daniel ZHANG
Primary-junior teacher candidates enrolled in Azza Sharkawy, Richard Reeve and Diane Lawrence’s science and technology education courses hosted the 25th annual Science Discovery Day at Queen’s Faculty of Education on January 31st, 2015 with funding from the MSTE group. The day has proven to be a memorable one in the past and this year was no exception with hundreds of parents and children in attendance. The day is looked at as an opportunity for youngsters to explore a variety of science and technology centres in a hands on way, and more importantly, a time when teacher candidates can observe and experience how children of all ages interact with the learning materials they have set up at their activity centres. There were 92 of them this year, all on different topics relating to the ministry guidelines for grade one to six in science and technology.
Science Rendezvous Kingston was held on May 9th, 2015 at The Rogers K-ROCK Centre. This event is a public celebration of science, and a great opportunity to showcase the excellent research in science and technology being carried out at Queen’s University. In the past, Science Rendezvous Kingston was held in May and it provided unique opportunities for learners of all ages to engage with physics, chemistry, geology, biology, astronomy and engineering. It involved faculty from three post-secondary institutions, local museums, citizen scientists, graduate and undergraduate students and secondary school students in a collaborative effort to bring science to the streets of Kingston. Congrats & thanks to Lynda Colgan and her team for organizing this important day.

Save the Date!! Please join us on.

SATURDAY, MAY 7, 2016
from 10:00 am to 3:00 pm at
The Rogers K-Rock Centre
for
Science Rendezvous Kingston
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. Dr. Vallentyne, B.A. 1949 (Queen’s), Ph.D. (Yale) was 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.”

Unlike some of the other award monies available to students at the end of their B.Ed. year, the Johnny Biosphere Fund encourages students to think about their environmental interests and commitments, and provides them a platform on which to act. Since the funds are not awarded for personal use, students applying for and ultimately receiving them are rewarded only through the results of their successful planning and action. Beyond the immediate environmental and educational benefits any project creates, and beyond the positive recognition our Faculty of Education and MSTE Group receives through their completion, the leadership and dedication developed by teacher candidates applying for and receiving Johnny Biosphere awards are attributes we wish to foster in new teachers. Congratulations to the recipients of the fund for 2014-2015!

George Woodhouse’s focus on environmental education was an arts-based project. He wrote “The Good Food Song” and used his funding to have it recorded. His plans are to collaborate with others to create a Good Food Song video and potentially partner with organizations like Food Secure Canada to bring it to schools/the public. https://soundcloud.com/george-woodhouse

Chelsea Ljutic applied to the Johnny Biosphere Fund with the aim of “synthesizing indigenous knowledge with environmental education to develop a database of elders and knowledge keepers who wish to deliver presentations to promote environmental stewardship and appreciation for the earth”. Her efforts have become “Project Aki”. Realizing the size of the project she has started, Chelsea has initiated her database and organized an administrative framework for future guest presentations using Johnny Biosphere funding, and now plans to continue on her own. Her funding was used to have a website created as the focus for this and future work.
Julia Martini and Vidya Hemraj’s intentions were to develop a partnership with a community centre or school and offer interactive environmental awareness workshops. An activity that Vidya was able to do with grade ones at The Riverwood Conservancy in Mississauga, ON that was relatable to the curriculum expectations for living things was to help students make dirt babies. Overall, this activity integrated both art and science, which was one of the goals for the project. Vidya had the opportunity to do this workshop twice, with a total of 50 grade one students.

Melissa Morelli successfully worked with her Practicum School on an initiative that helped to raise the school from a “silver” eco school, to a “gold” eco one. Melissa used funds to buy supplies for the establishment of a Peace Garden at the school. Interest was high for this project resulting in donations that helped reduce the cost. Multiple grades were involved in the planning and building of the garden and many more will be involved in planting and eventual harvesting. Ties have been made to the Life Science curriculum as well as to 3R’s initiatives already underway at the school.

**MSTE Doctoral Fellow**

To acknowledge the importance of encouraging doctoral scholars in the field, MSTE annually offers a scholarship to an outstanding research candidate. Congratulations to the 2015/2016 candidate Adelina Valiquette!

Adelina brings passion and practical experience to MSTE events and to the field of mathematics. Working as a math teacher in Ontario and Internationally, Adelina has become increasingly interested in the role that parents play in their children’s math education. She believes there is much to learn about the factors that influence parental engagement both within and between cultures. Parents impact and shape the math education of their children in so many different ways depending on a complex set of factors. Adelina aims to develop a deeper understanding of these factors during her doctoral research. Adelina is very grateful for the balance that this award will help her to achieve between her work, her studies and her family.
MSTE Apprentice

To provide opportunities for graduate 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 apprentice for 2015/2016 is Heather Braund.

Heather (Trent B.Sc. Hons, Queen’s B.Ed) is currently in the 2nd year of the Master’s of Education program. Her research focuses on teachers’ perspectives on metacognition, and the integration of metacognition within elementary science education. She has always had a passion for teaching math and science, hoping to foster a love for these disciplines along the way in students of all ages. This position has allowed Heather to work collaboratively with members of the MSTE group through planning for the 25th anniversary celebration, guest speakers, and upcoming MSTE events. Heather looks forward to continuing her work with the MSTE group and is very appreciative of this opportunity, which has allowed her to combine her passion for science, math, learning, and research.

Upcoming Events

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<td>March 31 &amp; April 1, 2016</td>
<td>McArthur Hall</td>
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<td>Grade 9 MathMashup</td>
<td>Thursday April 9, 2016</td>
<td>McArthur Hall</td>
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<td>MSTE-QSLMA 7/8 Math Olympics</td>
<td>Tuesday April 19, 2016</td>
<td>McArthur Hall</td>
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<td>Science Rendezvous</td>
<td>SATURDAY, MAY 7, 2016</td>
<td>Rogers K-Rock Centre</td>
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<td>Canadian Mathematics Education Study Group 2016 Conference</td>
<td>June 3rd–June 7th 2016</td>
<td>(hosted by) Queen’s University</td>
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# MSTE Current Members

## Executive

**Jamie Pyper**, Coordinator  
Ph.D. OISE/UofT, M.Ed. Western,  
B.Ed. UofT, B.Math. Waterloo  
**Faculty Profile**  
**Professional Profile (Teaching)**

**Joan McDuff**, Executive  
(Elementary Mathematics)  
M.Ed. Queen's, B.Ed. UManitoba,  
B.A. UManitoba  
**Faculty Profile**

**Richard Reeve**  
Computers in Education, Science  
B.A., B.Ed. (Queen’s), M.Ed., Ph.D.  
(OISE/Toronto)  
**Faculty Profile**

**Ann Marie Hill**, Executive  
Technology  
B.Ed., Dip.Ed. (McGill),  
Ph.D. (Ohio State)  
**Faculty Profile**

## Full Members

**Peter Chin**  
Science, Chemistry  
B.Sc. (Alberta), B.Ed., M.Sc. (Calgary),  
Ph.D. (British Columbia)  
**Faculty Profile**

**Cathy Christie** (Science)  
B.Sc., M.Sc., B.Ed., Ph.D. (Queen’s)  
**Faculty Profile**

**Lynda Colgan**  
Mathematics  
B.Sc., B.Ed. (Toronto), M.Ed. (OISE),  
Ph.D. (Toronto)  
**Faculty Profile**

**Azza Sharkawy**  
Elementary Science  
B.Schl. (Toronto), B.Ed. (McGill),  
M.A., Ph.D. (OISE/UT).  
**Faculty Profile**

**Tom Russell**  
Science  
A.B. (Cornell), M.A.T. (Harvard),  
Ph.D. (Toronto)  
**Faculty Profile**

**Peter Taylor**  
Cross-appointment, Department of  
Mathematics and Statistics  
Ph.D. Harvard, M.A. Queen’s, B.A. Queen’s  
**Faculty Profile**

**Diane Lawrence**  
Elementary Science  
B.Sc. (Hons) (McMaster),  
B.Ed. (Western), M.Ed. (Queen’s)  
**Faculty Profile**

## Group Non-Academic Staff Members

**Bonnie Knox**, Secretary

## Associate Members

**Wendy Powley**, PhD, Adjunct Faculty, I/S computer science  
**Ena Holtermann**, Lecturer, Technology Education