Centre for
Science, Mathematics
& Technology Education
OISE, University of Toronto

SUMMER 2020 NEWSLETTER

IN THIS ISSUE

DIRECTOR'S MESSAGE

Even though our 2019/2020 academic year did not end the way we had anticipated, we were able to achieve a lot prior to the pandemic lock-down. Thank you to the many members who have continued to faithfully support the Centre and who have volunteered their time and intellect during our various activities and events. I also acknowledge the input of members who have been unable to attend the meetings but have contributed ideas and encouragement to the Centre's various endeavors. It is my pleasure to bring to you just a snapshot of our collective work over the past year. I hope that this will serve as a reminder of what we have achieved together in the past and that it will inspire us to stay connected as a vibrant community in the future.

Carol-Ann Burke, Director, Centre for Science, Mathematics and Technology Education

OUR MISSION

We are a Centre for excellence in science, mathematics, and technology (SMT) education: undertaking research, development, and teaching that promote critical understanding, inclusion, diversity, equity, personal wellbeing, creativity, and social and environmental justice.

THIS YEAR'S HIGHLIGHTS: SMT CENTRE ACTIVITIES

SMT Panel: What Can You Do with a Graduate Degree in Science, Mathematics or Technology Education?

On the evening of Thursday 5 December 2019, the SMT Centre hosted a panel event for students, alumni and community members interested in science-, mathematics- and technology-related careers. The panel discussion also served as the launch event for the Curriculum & Pedagogy program's Emphasis in Science, Mathematics and Technology Education.

The evening brought together panelists who have used their graduate degrees in science, mathematics, or technology education to forge career paths outside of traditional school, college or university teaching and research roles. Panel members included five OISE alumni (listed as pictured above): Joyce Nyhof-Young, PhD; Alisa Acosta, PhD; Cresencia Fong, PhD; Zoya Padamsi, MEd; and Abigail Ramdeo, MT. The panel was hosted by Darren Hoeg, SMT alumnus and Assistant Professor in the Faculty of Education at York University.

Panelists spoke candidly about how they had used the transferrable skill set developed during their graduate degrees to face the challenges and opportunities they encountered when job-seeking in a competitive employment market. The panel presentations stimulated lively and engaged questions and commentary from audience members. A video recording of the event is available on the SMT website: https://www.oise.utoronto.ca/smt/resources/panel-discussions/.

SMT Centre Governance

As part of the Centre's governance structure, members voted and passed a new internal process for electing new Centre Directors. The process will rely on nomination and/or self-nomination, followed by an anonymous online vote if there is more than one nominee. The election of a new director should take place during the last SMT Centre meeting of the academic year. The initial length of the directorship should be two years, with the option for extension for up to five years with member agreement, as signified by a vote. Unfortunately, due to the pandemic, this process was disrupted at the end of the 2019/2020 academic year, so directorship arrangements were upheld until members can meet again to review the leadership structure.

New SMT Centre Collaborative Research Initiative

In November 2019, members participated in a half-day retreat to plan and organize the Centre's funded research initiative: ***Important Questions in Science, Technology, Engineering, and Mathematics (STEM) Education – A Colloquium for Exploring New Research Directions.*** The focal points of the initiative were to provide opportunities for public engagement with the research activities of the Centre and create conditions for development of new collaborative research projects.

The one-day research and practice colloquium was planned for Wednesday April 29, 2020, bringing together approximately 50 member-nominated researchers, graduate students, and community educators from across the Greater Toronto Area (GTA). The event would commence with a panel of invited speakers who would explore themes central to the Centre's mission statement: inclusion, diversity, equity, access, mental health and wellbeing, creativity, and critical thinking in STEM fields.

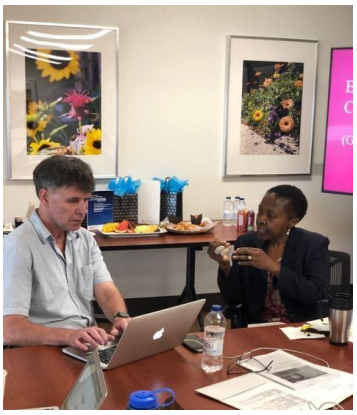
By February of 2020, the colloquium had taken shape and panelists and attendees were ready for the event. Sadly, as has been the case for many activities this year, we had to postpone the colloquium following federal and provincial guidelines regarding COVID-19. Given the enthusiastic response from potential panelists, participants, and attendees, we fully intend to revisit this event as soon as it is wise to do so. We extend a special thanks to Centre members, panelists, and community colleagues for their support of this endeavour.

Café in Theory

Café in Theory spent another year diving deep into science education theory and practice. Even though several members were abroad and teaching, the remaining and new SMT Centre members discussed works such as Bourdieu's *Science of Science and Reflexivity*, and Le Guin's *The Ones Who Walk Away from Omelas*. This year also marks the first, of hopefully many Café-member writing collaborations. Sarah El Halwany and Kristen Schaffer presented their co-authored paper weaving together stories of walking in urban natural settings (pictured here), *Feeling environmental policing: Possibilities and challenges for socioecological justice,* at the Science Education for Equity, Diversity & Social Justice (SEEDS) 2019 Conference in Norfolk, VA. Learn more about the group's activity on their website: https://cafeintheory.wordpress.com/. Café in Theory would like to thank the SMT Centre membership for continually advising and contributing to their activities.

NEWS FROM THE CANADIAN JOURNAL OF SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION (CJSMTE)

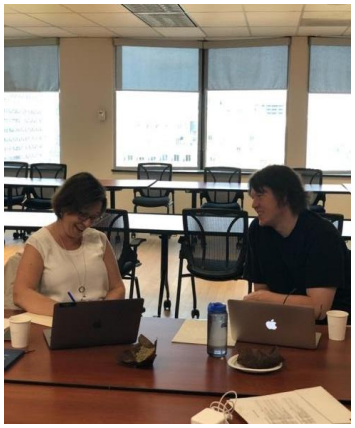
2019/2020 was an eventful and exciting year for the Canadian Journal of Science, Mathematics and Technology Education. At the beginning of 2019, Doug McDougall was appointed Editor-in-Chief; one of his new initiatives was establishing a semi-annual Editors' Retreat. This brings together all of the CJSMTE editors from the various Canadian provinces as well as one editor from abroad. The first Editors' Retreat, in June 2019, was an excellent learning and collaborative opportunity for the editors where they examined the review process and planned CJSMTE's 20th anniversary issue; this planning was concluded in the October Retreat.



Editors: Jim Hewitt and Wanja Gitari

The final 2019 issue, 19.4, continued to provide readers with thought-provoking articles and contained a tribute to John Wallace, CJSMTE Editor-in-Chief, 2007-2018. Journal staff were pleased to have this opportunity to thank John for his many years of service to CJSMTE.

The CJSMTE editorial office would also like to thank their editorial team for their excellent work this past year, taking a moment to highlight some special themes covered in the journal's twentieth year. Volume 20, Issue 1, contains a special theme on Engineering Education as well as an editorial written by the Editor-in-Chief. Articles from 20.1 can be accessed at https://link.springer.com/journal/42330/20/1. In Issue 20.2, there is a special theme on the "M in STEM". Issue 20.3 contains articles written by the Journal's current mathematics editors, and the final issue for 2020 will include articles from the original journal editors and authors to provide a retrospective review of the first 20 years of the Canadian Journal of Science, Mathematics and Technology Education.



Editors: Caroline Lajoie and Egan Chernoff

CJSMTE was represented at several conferences over the past year, including CSSE 2019 and Hawaii International Conference on Education 2020. These activities all help to raise awareness about the journal and form connections with scholars, nationally and internationally.

Editorial Assistant): Sofia Ferreyro-Mazieres

Editorial Assistant (on leave): Nadia Qureshi

Doug McDougall (Editor-in-Chief) and the Editorial Team. Journal website: www.springer.com/42330

SMT MEMBER MEETING PRESENTATIONS

This year, Centre members and community colleagues continued to share their research in a series of presentations. These presentations provided opportunities for researchers to discuss emerging, established, and recently completed research. As members, we value this opportunity to engage in scholarly discourse. We encourage members and potential members (particularly students completing thesis degrees), who wish to share their research, to contact the Centre administrators regarding the potential for making presentations at SMT Members' meetings in the future. We would also like to hear from SMT Centre members and associates who wish to solicit feedback on research-related ideas, such as creating new courses or thinking through ideas for proposed research.

- **Emmanuelle Le Pichon-Vorstman:** *Plurilingual pedagogies and digital technologies to support learning in science, technology, engineering and mathematics*
- **Carol-Ann Burke and Kristen Schaffer:** *Opportunities and challenges for community-based research collaborations in informal science education.*
- ***Joseph Wilson, Daniel Atkinson, Erin Sperling and Gurpreet Sahmbi*:** *Students' 3-minute thesis presentations*
- **Mayrose Salvador** (Pueblo Science): *Rural initiative for science education: Sustainably advancing science education in developing countries*
- **Lesley Wilton** (with virtual and in-person contributions by Pam Brittain, Matt Stodolak, and Preeti Raman)**:** *An introduction to artificial intelligence in education*
- **Rubaina Khan:** *Uncovering differences in the learning cultures of the engineering and education departments*

CONGRATULATIONS TO 2019/2020 SMT MASTER'S GRADUATES[1]

Rubaina Khan	*Uncovering differences in the learning cultures of the engineering and education departments*
Chelsie Leger	*Supporting English language learners in secondary school mathematics*
Joseph Wilson	*The ghost in the machine: Structural metaphors in the 'Golden Age' of artificial intelligence research, 1956-1976*

[1] The list highlights graduates who were student members of the SMT Centre.

CONGRATULATIONS TO 2019/2020 SMT DOCTORAL GRADUATES[2]

Ildiko Murrayne Biro Supervisor: **Douglas McDougall**	*Teacher collaboration for mandated accreditation: A case study of evaluating the international baccalaureate diploma program*
George Chiran Supervisor: Peter Sawchuk	*Expansive learning in technology startup organizations: An activity-theoretical approach*
Antoine Despres-Bedward Supervisor: **Clare Brett**	*Exploring online engineering education for sustainable development: Reconceptualizing curriculum at scale*
Ahmad Khanlari Supervisor: Marlene Scardamalia	*Knowledge building, innovation networks, and robotics in math education*
Jemille Lai-Yin Chu Morrison Supervisor: **Douglas McDougall**	*Empowering children through a global reading program*
Tasha Dianne Richardson Supervisor: **Erminia Pedretti**	*The use of digital video games (DVGs) in an elementary teacher education program: Exploring teacher candidates' attitudes and interests towards physics*
Juan Carlos Rodriguez Camacho Supervisor: **Clare Brett**	*Intersections of ethics of Indigenous health research and health research education*
Gurpreet Sahmbi Supervisor: **Douglas McDougall**	*A tale of two universities: Investigating factors affecting the secondary to tertiary transition into calculus for students in STEM programs*
Maria Serevetas-Paulovic Supervisor: **James Slotta**	*The teacher's role in orchestrating a knowledge community and inquiry classroom*
Sadia Sharmin Supervisor: **Clare Brett**	*The impact of open-ended exercises on creativity and motivation in introductory computer science*
Eiman Akram Darwish Zeini Supervisor: **Douglas McDougall**	*Examining the effectiveness of lesson study on teacher's practice in mathematics within a secondary school environment*

[2] The list highlights graduates who were student members of the SMT Centre or who were supervised by SMT Centre faculty members. Member names are in bold.

RECENT RESEARCH GRANTS, AWARDS AND HONOURS

Research Grants

Carol-Ann Burke [On behalf of the SMT Centre] (2019-2021). Important questions in science, mathematics, engineering, and technology (STEM) education: A colloquium for exploring new research directions. Research Grant (Centre Funding Competition). $12,957.

Stacy Costa (2019-2020). *Collaborative annotation and scientific inquiry: Students sharing science.* Ontario Graduate Scholarship (OGS). $15,000.

Michelle Dubek (2019-2021). *Full STEAM ahead: Exploring innovative assessment in integrated elementary classrooms.* SSHRC Insight Development Grant. $56,006. Co-applicant: Christopher DeLuca.

Wanja Gitari (2019-2020). *Enacting endogenous science for capacity building through a community innovation project (VIP) in Kenya*. SSHRC Institutional Grant. $2,250.

Emily Moore (2020-2021). *Who me, a leader? Understanding and transcending engineers' resistance to leadership.* SSHRC Partnership Engage Grant. $25,000. Co-applicants: **Cindy Rottmann** & Lee Weissling.

Cindy Rottman (2019-2020). *EIIP18-03–Scaling up Engineering Ethics and Equity: Lesson plans for Course Integration*. Engineering Instructional Innovation Program Grant. $40,000. Co-applicant: Doug Reeve.

Lesley Wilton (2019-2020). CTL Sessional Faculty Research Grant.

Earl Woodruff (2020-2021). *Enhancing international graduate student life: Expanding pre- and post-arrival online student support portal efficacy beyond Phase 1*. Co-applicant: **Jim Hewitt**

Awards & Honours

Alisa Acosta was invited to serve as a member of the Blockchain Program Advisory Council at the York University School of Continuing Studies, which is launching the first and only university continuing education blockchain programs in Canada. See the recent press release: https://www.newswire.ca/news-releases/canada-s-first-two-university-level-blockchain-programs-address-need-for-skilled-workers-during-global-pandemic-889470486.html

Alysse Kennedy was recipient of the OISE Alumni Association Doctoral Fellowship ($10,000).

Rubaina Khan was awarded a 2020 Engineering Education Teaching Fellowship Program Scholarship of Teaching and Learning. The title of the proposal was *Fostering a Learning Community in ESC203H1F: Engineering and Society*.

Emily Moore delivered an invited Keynote presentation on *Engineering Leadership* at the Professional Engineers of Ontario 2019 Volunteer Leadership Conference, Toronto, ON.

Anuli Ndubuisi was awarded a 2020 Engineering Education Teaching Fellowship Program Scholarship of Teaching and Learning. The title of the proposal was *Fostering Intercultural Skills and Virtual Collaboration in Engineering Education*.

Joyce Nyhof-Young was awarded the 2019 W. T. Aikins Award for Excellence in Teaching Performance – Foundations, Faculty of Medicine, University of Toronto.

Joyce Nyhof-Young was part of a community-integrated team who won the 2019 Excellence in Development and Use of Innovative Instructional Methods Award – Community Affiliated Site Category. Department of Family and Community Medicine, University of Toronto.

Joyce Nyhof-Young received the 2019 Education Scholarship Excellence Award – Senior Education Scientist Scholar. Department of Family and Community Medicine, University of Toronto.

John Percy delivered a Keynote Lecture, *A Half-Century of Astronomy Education and Outreach: Stories, Reflections, and Lessons Learned* at the in June 2019 joint conference of the Royal Astronomical Society of Canada, and the American Association of Variable Star Observers, York University, Toronto, ON.

John Percy received a *Gratitude Award* from the American Association of Variable Star Observers, for exemplary service to science, education, and outreach (June 2019). See the news release at https://www.aavso.org/thank-you-dr-john-r-percy.

Andrew Petersen was awarded an Ontario Confederation of University Faculty Associations (OCUFA) Teaching Award (October 2019). View the press release at https://ocufa.on.ca/ocufa-awards/teaching-and-academic-librarianship-awards/2018-2019-winners-ocufa-teaching-awards/.

Lesley Wilton was an invited speaker at the 2019 Master of Teaching Digital Day at OISE.

Joseph Wilson was granted a Department of Anthropology Conference Travel Award (April 2020).

MEMBERS' CORNER

SMT Faculty Profiles

Larry Bencze

Research Interests:
Critical & activist science & technology education; critical analyses of STEM education & emotions in education

Clare Brett

Research Interests:
Online learning; educational technology

Carol-Ann Burke

Research Interests:
Science education; postcolonial theory in science education; underrepresented youth in science

Michelle Dubek

Research Interests:
STEM education; co-teaching; assessment in integrated contexts

Greg Evans

Research Interests:
Engineering education; lab-based education; Competency development

Wanja Gitari

Research Interests:
Use of school/academic science in everyday life; access and equity in school/academic science

Gila Hanna

Research Interests:
Mathematics education; mathematical proofs; gender and mathematics education

Jim Hewitt

Research Interests:
Educational technology; computer-supported learning environments; electronic discourse; distance education

Sheliza Ibrahim Khan

Research Interests:
Science education; place-based education; STEM; critical pedagogy; mathematics education

Cathy Marks Krpan

Research Interests:
Mathematics education: Student communication; argumentation; English language learners; learners who struggle

Doug McDougall

Research Interests:

Mathematics education; teacher education; qualitative methods

Emily Moore

Research Interests:

Engineering leadership; student motivation and team dynamics; systems thinking

Erminia Pedretti

Research Interests:

Science education; STSE education; science museums; controversy and exhibition practices; teacher education; action research

John Percy

Research Interests:

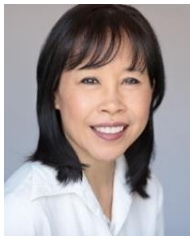
Astronomy and astrophysics; nature and evolution of stars; formal and informal astronomy education

Christina Phillips

Research Interests:

Science education; environmental education; STEM education

Mary Reid



Research Interests:

Math education; teacher education; professional learning; educational technology

Jim Slotta

Research Interests:

Learning sciences; technology enhanced learning environments; collaborative learning; STEAM inquiry

John Wallace

Research Interests:

Curriculum integration; science education; teacher learning; STEM; qualitative research

Lesley Wilton

Research Interests:

Online learning (e-learning and blended learning); pre-service education; teaching with technology; social practices and new literacies

SMT Student Profiles

Blair Abraham

Research Interests:
Math anxiety in elementary students

Thelma Akyea

Research Interests:
Black Canadian women in physics

Daniel Atkinson

Research Interests:
Food education; health education; science education

Pamela Brittain

Research Interests:
Mathematics (elementary and pre-service teachers)

Jennifer Calix

Research Interests:
Technology education; mathematics education

Stacy Costa

Research Interests:
Mathematics education; knowledge building; STEM; collaborative learning; computational thinking

Sarah El Halwany

Research Interests:
Affect/emotions in science education; STSE education

Sofia Ferreyro-Mazieres

Research Interests:
Mathematics Education

Darlee Gerard

Research Interests:
Science/engineering/STEM education; experiential and co-curricular learning; access to/equity in education; outdoor/ environmental education

Alysse Kennedy

Research Interests:
Environmental and sustainability education; teacher education; outdoor education; Indigenous education; action research

Rubaina Khan

Research Interests:
Engineering education; engineering design; online learning

Eitan Laufer

Research Interests:
Equity issues in STEM education; K-12

Chelsie Leger

Research Interests:
Mathematics education

Nurul Hassan Mohammad

Research Interests:
STEM education; identity; postsecondary education; higher education

Rumina Musani

Research Interests:
Medical education/pathology education; collaborative online learning

Anuli Ndubuisi

Research Interests:
Engineering education; collaborative learning; computer-supported collaborative learning

Sa'diyya Parnell-Hendrickson

Research Interests:
Mathematics education; self-regulated learning

Nadia Qureshi

Research Interests:
Experiences in science education of racialized students

Kristen Schaffer

Research Interests:
Informal science education; community-responsive research; ecology education

Erin Sperling

Research Interests:
Food justice education through an ecojustice lens; ecojustice pedagogy for teacher education

Joseph Wilson

Research Interests:
Metaphor studies; laboratory life; discourse analysis; artificial intelligence; communicating science

Majd Zouda

Research Interests:
Activist science education; STSE/socioscientific issues; STEM education; elite schools; action research; critical discourse analysis

Affiliate and Alumni Members

Affiliates: Alisa Acosta; Maydianne Andrade; Andrea Chan; George Chiran; Cresencia Fong; Einat Gil; Darren Hoeg; Albert Huynh; Qin Liu; Martha Marandino; Elham Marzi; Joyce Nyhof-Young; Andrew Petersen; Cindy Rottmann; Mayrose Salvador; Chirag Variawa; Michael Waldman; Zhaoyun Helen Wang; Di Zhang

Alumni: Alex Bing; Nasim Booloorsaz Mashhadi; James Crimmins; Ahmad Khanlari; Clauda Mandekic; Zoya Padamsi; Abigail Ramdeo; Tasha Richardson; Gurpreet Sahmbi

Remembering Alvin Singh

Alvin Singh was an enthusiastic student member of the SMT community. He was an MEd student in the Curriculum & Pedagogy program at OISE, where he was pursuing his interests in active and experiential learning, scientific literacy, biology, statistics, STEM education, and outreach. Alvin's passion for education was evident in his award-winning work as a teaching assistant and guest lecturer to undergraduate students in the Biology Department at University of Toronto, Mississauga. He also loved to connect with children in schools as a STEM outreach instructor. At 30 years of age, Alvin died of cancer on September 13, 2019. His friends and colleagues attest to his compassion, generosity, and warmth. He will be greatly missed by the SMT community.

Selected Member Publications for 2019/2020

(*indicates student SMT Centre member authorship; member names in bold; no more than 3 publications submitted per member, but some names appear more than 3 times due to extensive collaboration and submissions made by multiple members.)

Achiam, M., & **Marandino, M.** (2019). Intended and Realised Educational Messages of Dioramas–An International Comparison. In A. Scheersoi & S. D. Tunnicliffe (Eds.), *Natural history dioramas–Traditional exhibits for current educational themes* (pp. 131-145). Cham, Switzerland: Springer.

Bencze, L., *El Halwany, S., Milanovic, M., ***Qureshi, N.,** & ***Zouda, M.** (2019). Bloqueios ao engajamento cívico crítico e ativo na/através da Ciência Escolar: Histórias do Campo. [Roadblocks to critical and active civic engagement in/through school science: Stories from the field.] *Educação e Fronteiras, 9*(25), 47-70.

Bencze, J. L., *El Halwany, S., & ***Zouda, M.** (2020). Critical and active public engagement in addressing socioscientific problems through science teacher education. In M. Evagorou, J. Alexis Nielsen, & J. Dillon (Eds.), *Science teacher education for responsible citizenship: Towards a pedagogy for relevance through socioscientific issues* (pp. 63-83). Cham, Switzerland: Springer.

Bencze, L., Pouliot, C., **Pedretti, E.,** Simonneaux, L., Simonneaux, J., & Zeidler, D. (2020). SAQ, SSI and STSE education: Defending and extending 'science in context'. *Cultural Studies of Science Education.* doi: https://doi.org/10.1007/s11422-019-09962-7

Burke, L. E. C. (2019). *Engaging children and youth from low-income communities in science learning: A final report prepared for the Council of Ontario Directors of Education*. Department of Curriculum, Teaching and Learning, Ontario Institute for Studies in Education, University of Toronto, Toronto, ON. Retrieved from http://www.ontariodirectors.ca/downloads/Engaging_Children_and_Youth_in_Science_CODE_Final_Report.pdf

Burke, L. E. C., Chong, A., **Evans, G**., & Romkey, L. (2020). Cultivating disciplinary expectations for engineering education research in Canada. *Canadian Journal of Science, Mathematics & Technology Education, 20*(1), 87-97.

Burke, L. E. C., & **Wallace, J. W.** (2020). Re-examining postcolonial science education within a power-knowledge framework: A Caribbean case study. *Science & Education, 29*(3). 571-588.

Cassidy, R., Charles, E. S., & **Slotta, J. D.** (2019). Active learning: Theoretical perspectives, empirical studies, and design profiles. *Frontiers in ICT, 6*(3). doi: 10.3389/fict.2019.00003

Chen, Y., Chor, A., **McDougall, D**., & Zheng, C. (2019, October). *Teacher collaboration on critical thinking tasks in mathematics classrooms: Teacher learning in a Canada-China partnership project.* Paper presented in the Sixth Annual International Conference on Reciprocal Learning. Windsor, ON.

Chen, Y., **McDougall, D.**, Chor, A., Zheng, C., & Spencer-Burgess, L. (2019, June). T*he influence of culture on mathematics teaching between Canada and China through co-teaching in a Canada-China reciprocal learning project: A case study.* Paper presented at the Canadian Society for the Study of Education (CSSE), Vancouver, BC.

***Costa, S.** (2019). Knowledge building, mathematics, and creative thinking: An overview on Ontario elementary mathematical teaching beyond twenty-first-century skills. In M. Danesi (Ed.), *Interdisciplinary perspectives on math cognition* (pp. 277-286). Cham, Switzerland: Springer.

Craig, M., **Petersen, A.,** & Campbell, J. (2019). Answering the correct question. In *Proceedings of the ACM Conference on Global Computing Education* (pp. 72-77). New York, NY: Association for Computing Machinery.

Dubek, M., Doyle-Jones, C., & Boldyreva, E. (2019, June). *Faculty development: Leveraging a co-teaching approach.* Poster presented at Canadian Society for the Study of Education (CSSE) 47th Annual Conference, Vancouver, BC.

Dubek, M., **Burke, L. E. C.**, & **Phillips, C.** (2019, June). *Methods and strategies for exploring engineering with primary/junior/intermediate teacher candidates.* Paper presented at Canadian Society for the Study of Education (CSSE) 47th Annual Conference, University British Columbia, Vancouver, BC.

Elias, P. & ***Qureshi, N.** (2019, June). Adult education and transitional learning: Interrogating "transition" in literacy and basic skills programming. In J. P. Egan (Ed.), *Proceedings of the 38th CASAE Annual Conference* (p. 342-348). Ottawa, ON: Canadian Association for the Study of Adult Education (CASAE).

Eyal, L., & **Gil, E.** (2020). Design patterns for teaching in academic settings in future learning spaces. *British Journal of Educational Technology, 51*(4), 1061-1077.

Garrett, F., Stradz, L., ***Kennedy, A.**, Price, M., and Suri, S. (2019). Learning outdoors and the humanities classroom. *Pathways: The Ontario Journal of Outdoor Education, 32*(1), 4-18.

Gil, E. (2019, June). *Teaching and learning in future learning spaces: An exploration in a college of education.* Paper presented at the 7th international Conference on Teacher Education: The story of innovation in teacher education. Tel-Aviv, Israel.

Giuseppe, M., Elliott, P., **Ibrahim Khan, S.,** Rhodes, S., Scott, J. & Steele, A. (2019). Rising to the Challenge: Promoting Environmental Education in Three Ontario Faculties of Education. In D. Karrow & M. Giuseppe (Eds.), *Canadian perspectives in initial teacher environmental education praxis*. (pp. 139-159), Cham, Switzerland: Springer.

Hanna, G., & Larvor, B. (2020). As Thurston says? On using quotations from famous mathematicians to points about philosophy and education. *ZDM Mathematics Education*. doi: https://doi.org/10.1007/s11858-020-01154-w1.

Hanna, G., Reid, D. A., & de Villiers, M. (2019). Proof Technology: Implications for Teaching. In **G. Hanna,** D. A. Reid, & M. de Villiers (Eds.), *Proof technology in mathematics research and teaching* (pp. 3-9). New York, NY: Springer.

Hilker, N., Wang, J. M., Jeong, C. H., Healy, R. M., Sofowote, U., Debosz, J., ... **Evans, G. J.** (2019). Traffic-related air pollution near roadways: Discerning local impacts from background. *Atmospheric Measurement Techniques, 12*(10), 5247-5261.

Ibrahim Khan S. (2019, June). *Connecting place and STEM education for historically silenced communities to share and learn.* Paper presented at the 1st Annual STEMS² (Science, Technology, Engineering, Mathematics, Social Studies and Sense of Place) Symposium, Honolulu, HI.

Ibrahim Khan S. (2020). Fostering equitable and inclusive STEM opportunities. In C. Rutherford (Ed.), *Proceedings of the Inaugural Canada-Caribbean Research Institute Symposium.* St. Catharines, ON. Retrieved from https://journals.library.brocku.ca/index.php/cancarib/article/view/2349

Jeong, C. H., Salehi, S., Wu, J., North, M. L., Kim, J. S., Chow, C. W., & **Evans, G. J.** (2019). Indoor measurements of air pollutants in residential houses in urban and suburban areas: Indoor versus ambient concentrations. *Science of The Total Environment, 693*(133446).

Joordens, S., Paré, D., Walker, R., **Hewitt, J. & Brett, C.** (2019). Scaling the development and measurement of transferable skills: Assessing the potential of rubric scoring in the context of peer assessment. Toronto, ON: Higher Education Quality Council of Ontario.

Kashtan, Y., **Gil, E.**, & Mualem, R. (2019, August). *Embodiment as a teaching practice in high school level physics.* Paper presented at the European Association for Research on Learning and Instruction (EARLI) 2019 Conference, Aachen, Germany.

***Khan, R., Wilton, L., Brett, C.,** & Alexander, P. (2020, April). *Instructors' perspectives on private interactions within online discussions.* Poster accepted for presentation for American Educational Research Association (AERA) Annual Conference, San Francisco, CA. [Conference cancelled due to COVID-19 pandemic.]

Kovalchuk, S., **Liu, Q**., **Rottmann, C.**, Klassen, M., Ricci, J., Reeve, D., & **Moore, E.** (2019, June). *Perceived importance and confidence in leadership ability: A national survey of final year Canadian engineering students.* Paper presented at the American Society of Engineering Education (ASEE) Annual Conference & Exposition, Tampa, FL.

Liu, Q., Reeve, D., **Rottmann, C.**, & **Moore, E**. (2020). Examining workplace affordance and student engagement in engineering co-op and internship literature. *Canadian Journal of Science, Mathematics and Technology Education 20*(1), 116–129.

Marandino, M., Bueno, J., Achiam, M., & Laurini, C. (2019). Teaching and learning biodiversity with dioramas. In A. Scheersoi & S. D. Tunnicliffe (Eds.), *Natural history dioramas–Traditional exhibits for current educational themes* (pp. 185-200). Cham, Switzerland: Springer.

Marandino, M., & Gouvêa, G. (2020). Science education research in science and technology museums in Brazil. In C. N. El-Hani, M. Pietrocola, E. F. Mortimer, & M. R. Otero (Eds.), *Science education research in Latin America* (pp. 523-553). Danvers, MA: Brill Sense.

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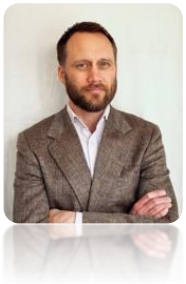
Creative Output

***Qureshi, N.** & Khan, S. (25 August 2019). *Baby Yasmeen.* St Mike's Hospital, Toronto, ON.

SMT MEMBERS AND COVID-19

In March 2020, following federal and provincial guidelines, and OISE's own internal measures regarding the COVID-19 pandemic, all in-person SMT Centre gatherings were postponed. COVID-19 has quickly changed the landscape of science, mathematics and technology education research. Members have been creatively and critically responding to the global pandemic. Below we share a few examples of how SMT Centre members have risen to the challenge of our current situation.

Joseph Wilson, a regular contributor to CBC Parents, shifted his writing focus to address parenting, online learning, and science communication during COVID-19. Check out his 17 April 2020 article, *I'm Thinking Beyond Online Learning, So I Asked My Daughter to Write Half This Article:* https://www.cbc.ca/parents/learning/view/online-learning-covid-19-parenting.

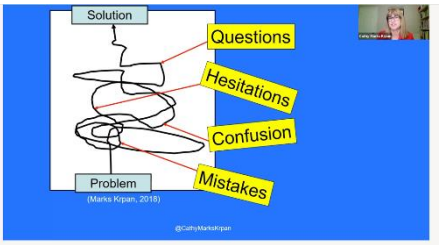


Joyce Nyhof-Young and colleagues responded to COVID-19 with their co-authored submission to the Canadian Medical Education Journal. Their article, *Limitations In Virtual Clinical Skills Education For Medical Students During COVID-19*, highlights medical students' experiences of remote learning and isolation from their typical learning contexts, proposing the use of wearable, point-of-view camera technology as a promising approach to support virtual clinical skills training. See the article at https://doi.org/10.36834/cmej.70240.

Mayrose Salvador and her non-profit organization, Pueblo Science started a free on-line program for children 10 years old and below. The program, called *Good Morning Science: Home Edition*, is a weekly forty-five minute live streamed program that brings fun and hands-on learning to children. During the stream, a Pueblo STEAM instructor demonstrates and provides easy-to-follow instructions on how to perform engaging experiments using only materials generally available in homes. Simultaneously, on a live chat, instructors are available to answer questions or provide troubleshooting assistance as needed. Alon Eisenstein, currently an OISE student, has been hosting the program. View the program at https://www.facebook.com/PuebloScience/videos/236206810779444.

Stacy Costa, a puzzle maker, contributed to the *OISE Stay at Home Club* initiative with her presentation about the various benefits of puzzles. Check out the video at https://twitter.com/OISEUofT/status/1258773430050140160. The video was viewed more than 1000 times.

Cathy Marks Krpan, like many SMT Centre members, had a conference cancelled due to COVID-19. The *National Council of Teachers of Mathematics (NCTM) Annual Meeting and Exposition* is the largest of its kind in North America and was due to celebrate its 100th anniversary in San Diego, California in April 2020. NCTM made the decision to provide free access webinars for 'NCTM 100 Days of Professional Learning' available at https://www.nctm.org/100-Days-of-Professional-Learning/. Cathy was invited to present her work, *Math + Language Teaching Strategies = Success (Grades 6-8)*, exploring how teachers can effectively support students to read and comprehend word problems, using think-alouds and other language arts tools: https://www.nctm.org/online-learning/Webinars/Details/360. More than 650 people from all around the world (including people from all 50 U.S. States and all Canadian Provinces, New Zealand, India, Angola and Indonesia) attended Cathy's live presentation, in addition to the 4000+ views since its release.

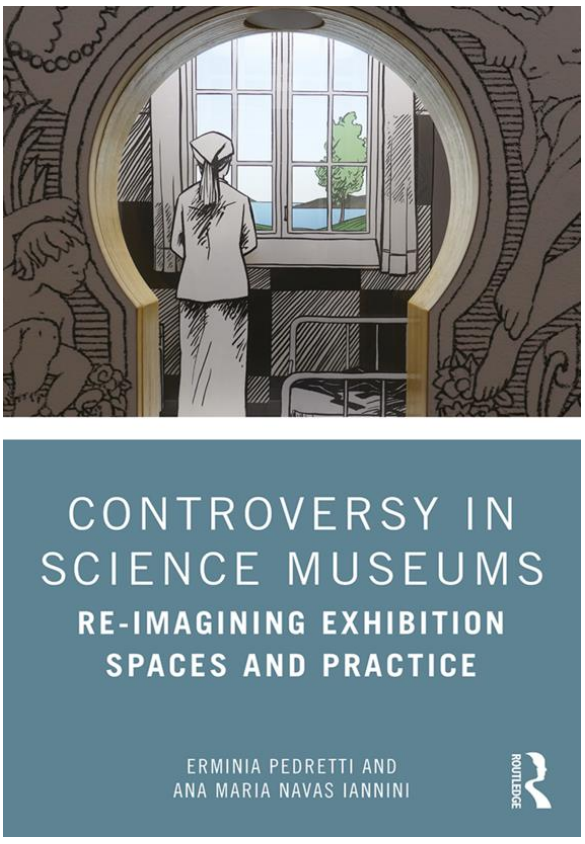


Math + Language Teaching Strategies = Success! (Grades 6-8) - Cathy Marks Krpan

UPCOMING EVENTS & MEMBER ANNOUNCEMENTS

Announcing a New Book

Controversy in science museums: Re-imagining exhibition spaces and practice
Erminia Pedretti & Ana Maria Navas Iannini



Controversy in Science Museums focuses on exhibitions that approach sensitive or controversial topics.

With a keen sense of past and current practices, Erminia Pedretti and Ana Maria Navas Iannini examine and re-imagine how museums and science centres can create exhibitions that embrace criticality and visitor agency.

Drawing on international case studies and voices from visitors and museum professionals, as well as theoretical insights about scientific literacy and science communication, the authors explore the textured notion of controversy and the challenges and opportunities practitioners may encounter as they plan for and develop controversial science exhibitions. They assert that science museums can no longer serve as mere repositories for objects or sites for transmitting facts, but that they should also become spaces for conversations that are inclusive, critical, and socially responsible.

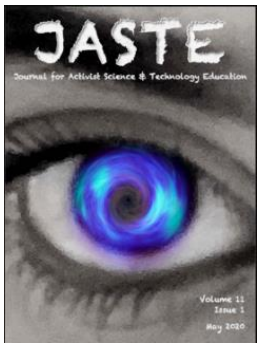
Controversy in Science Museums provides an invaluable resource for scholars and students working in the fields of museum studies, science communication, and social studies of science, and for museum professionals who are interested in creating and hosting controversial exhibitions. Book launch date to be determined.

The book is currently available at: https://www.taylorfrancis.com/books/9780429507588

Journal Activities

Journal for Activist Science and Technology Education (JASTE)

Larry Bencze



The latest special issue of the journal, the third school-based issue, is here: tinyurl.com/yb45cbmv. It is different from the two previous JASTE school-based issues in that teachers and students in their classes have made contributions and there are articles from a curriculum coach, educational researchers, and a science education professor. In this way, it is much more of a holistic view of the STEPWISE project.

Proposal for an Open-Access SMT Journal

Larry Bencze

I propose that the SMT Centre publishes 1-2 issues per year of an open-access, non-refereed journal that features research-informed and theoretically-argued writing from its members. A special character of this journal would be peer feedback, perhaps as simultaneously-published response articles. This would provide graduate students (including MT students) and others with a forum for scholarly communications. Given that copyright would be retained by authors, they would have the option to publish their work in refereed outlets. In that light, a suitable name for the journal may be something like, *The SMT Forum*. I propose to serve as this journal's first Editor-in-Chief, but I would welcome editorial collaboration with interested SMT members. I have experience with this kind of editorship, having co-founded and co-edited the journal JASTE - which uses the highly successful Open Journal Systems (OJS) publishing service. This proposal will be discussed in an upcoming Centre membership meeting.

Technology Activities

PeppeR

Jim Hewitt

Pepper is an online learning environment that is currently in wide use across OISE. Well over 2000 students make regular use of the software. Last year (2019) was the first full year that Pepper was made available to all instructors at the University of Toronto. Pepper is the first educational software program from OISE to be added to Quercus as part of the University of Toronto educational software toolkit.

ACKNOWLEDGEMENTS

This newsletter was prepared with the invaluable support of Kristen Schaffer (SMT Centre Assistant, 2019-2020). The Centre Director apologises in advance for any errors that may appear in this publication.

Information presented in this newsletter covers the period from May 2019 to April 2020 (inclusive) and members have restricted themselves to no more than three publications each to provide a sample of their work. [Some members appear more than 3 times in the publication list, illustrating the extensive degree of collaboration occurring between Centre members.]

Centre for
Science, Mathematics
& Technology Education
OISE, University of Toronto

252 Bloor Street West, Toronto, ON M5S 1V6
https://www.oise.utoronto.ca/smt/
smtcentre@utoronto.ca