



Invited talk at QUT May 26, 2020

The Silver Lining of the Pandemic

*Implications for STEM Teacher
Education*

Drs. David Anderson and Marina Milner-Bolotin
UBC Department of Curriculum and Pedagogy



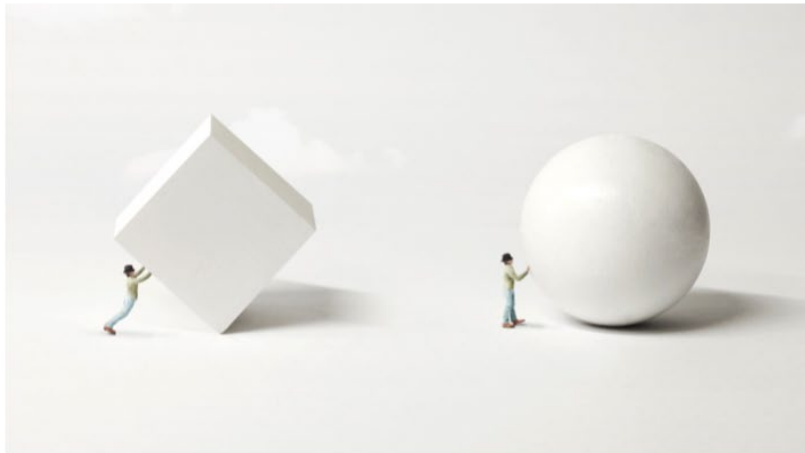
Presentation Overview

1. **Contemporary Context:** Online Education vs Emergency Remote Teaching.
2. **UBC Context:** History of Online Education at UBC FoE.
3. **Examples:** Museum Ed. & Master's in Science Ed.
4. **Challenges & Opportunities** for Research & Practice.
5. **Q&A**

The Difference Between Emergency Remote Teaching and Online Learning

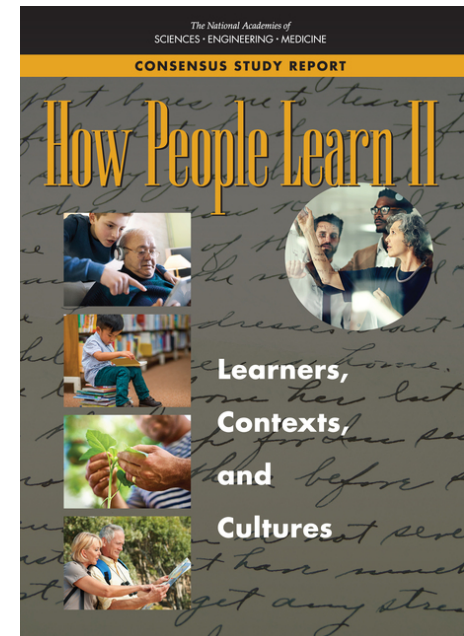
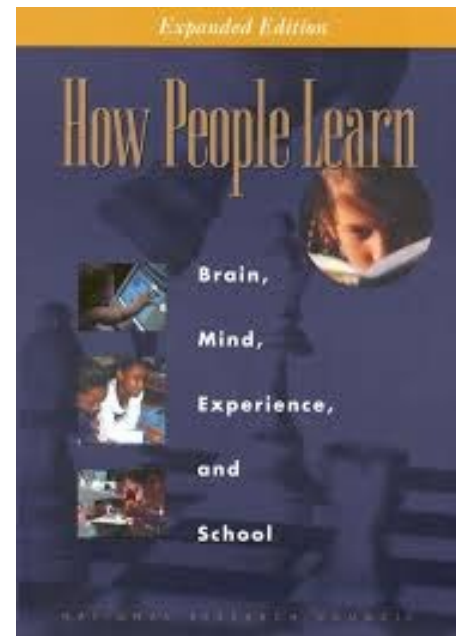
by Charles Hodges, Stephanie Moore, Barb Lockee, Torrey Trust and Aaron Bond Friday, March 27, 2020

Well-planned online learning experiences are meaningfully different from courses offered online in response to a crisis or disaster. Colleges and universities working to maintain instruction during the COVID-19 pandemic should understand those differences when evaluating this emergency remote teaching.



Credit: frankie's / Shutterstock.com © 2020

Due to the threat of COVID-19, colleges and universities are facing decisions about how to



<https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>

EDUCATION

How are Canadian kids holding up amid COVID-19? Survey finds worries about missed class



BY JON AZPIRI - GLOBAL NEWS

Posted May 11, 2020 8:00 am

Updated May 11, 2020 8:24 am

Global News Morning BC
COVID-19's impact on children

How Are Kids Holding Up?

- 71% say they are "bored"
- 41% say they feel "normal"
- Kids 16+ are twice as likely as younger children to feel "angry"
- 10 to 12 year olds are most likely to say they are "good" or "happy"

ANGUS REID SURVEY

Children struggling to cope with COVID-19 shutdown

Global NEWS

01:23 / 03:51

— While children have been less likely than adults to be infected with COVID-19 they have been vulnerable to the pandemic in many other ways. A new survey by the Angus Reid Institute looks at how kids are coping.

[Angus Reid Survey: How Canadian kids feel during the pandemic:](https://globalnews.ca/news/6922611/covid-19-kids-survey/)

<https://globalnews.ca/news/6922611/covid-19-kids-survey/>

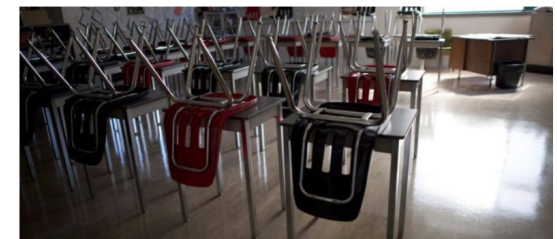
<http://angusreid.org/covid19-kids-opening-schools/>

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Kids & COVID-19: Canadian children are done with school from home, fear falling behind, and miss their friends



Contemporary Context



How has your online schooling been going so far?
(Only those doing online school asked)

	Kids “attending” school online total (n=536)	Age of Child		
		10 – 12 (n=187)	13 – 15 (n=192)	16 – 17 (n=158)
Keeping up or Falling behind?				
Keeping up	75%	79%	70%	75%
Falling behind	25%	21%	30%	25%
Enjoying it or Disliking it?				
Enjoying it	43%	51%	35%	43%
Disliking it	57%	49%	65%	57%
Are you Motivated or Unmotivated				
Motivated	40%	46%	34%	41%
Unmotivated	60%	54%	66%	59%

[Angus Reid Survey: How Canadian kids feel during the pandemic:](#)

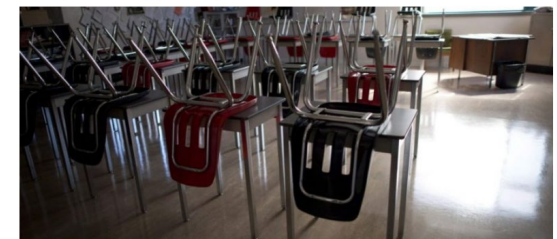
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EDUCATION

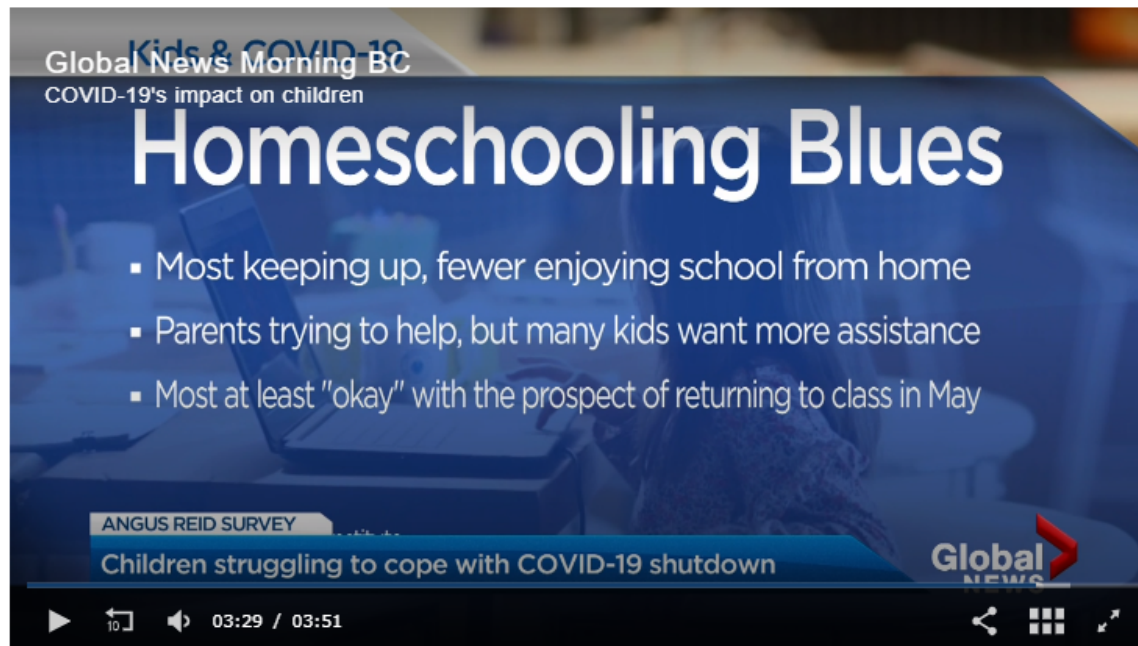
How are Canadian kids holding up amid COVID-19? Survey finds worries about missed class



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Parental involvement is the key in successful online education for children. The kids who don't have family support are at a disadvantage.

— While children have been less likely than adults to be infected with COVID-19 they have been vulnerable to the pandemic in many other ways. A new survey by the Angus Reid Institute looks at how kids are coping.

Online Learning Adults vs. Children

Adults:

1. Can draw on the wealth of experiences
2. Aren't always open to taking directions from others
3. Adults need opportunities to reflect on their work
4. Adults have pre-conceived notions on education
5. Are often afraid of failure (low self-esteem)

Teachers:

1. Often have strong views about learning environments, grading, feedback, etc.
2. Have uneven workload (marking, exams, parents,...)
3. Sometimes contradict their own notions as students

Online Learning Design

Online learning design options (moderating variables)

Modality

- Fully online
- Blended (over 50% online)
- Blended (25–50% online)
- Web-enabled F2F

Pacing

- Self-paced (open entry, open exit)
- Class-paced
- Class-paced with some self-paced

Student-Instructor Ratio

- < 35 to 1
- 36–99 to 1
- 100–999 to 1
- > 1,000 to 1

Instructor Role Online

- Active instruction online
- Small presence online
- None

Student Role Online

- Listen or read
- Complete problems or answer questions
- Explore simulation and resources
- Collaborate with peers

Online Communication Synchrony

- Asynchronous only
- Synchronous only
- Some blend of both

Pedagogy

- Expository
- Practice
- Exploratory
- Collaborative

Role of Online Assessments

- Determine if student is ready for new content
- Tell system how to support the student (adaptive instruction)
- Provide student or teacher with information about learning state
- Input to grade
- Identify students at risk of failure

Source of Feedback

- Automated
- Teacher
- Peers

Source: Content adapted from Barbara Means, Marianne Bakia, and Robert Murphy, *Learning Online: What Research Tells Us about Whether, When and How* (New York: Routledge, 2014).

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between Emergency Remote Teaching and Online Learning. *EDUCAUSE Review*, <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>.

CHAPTER 7

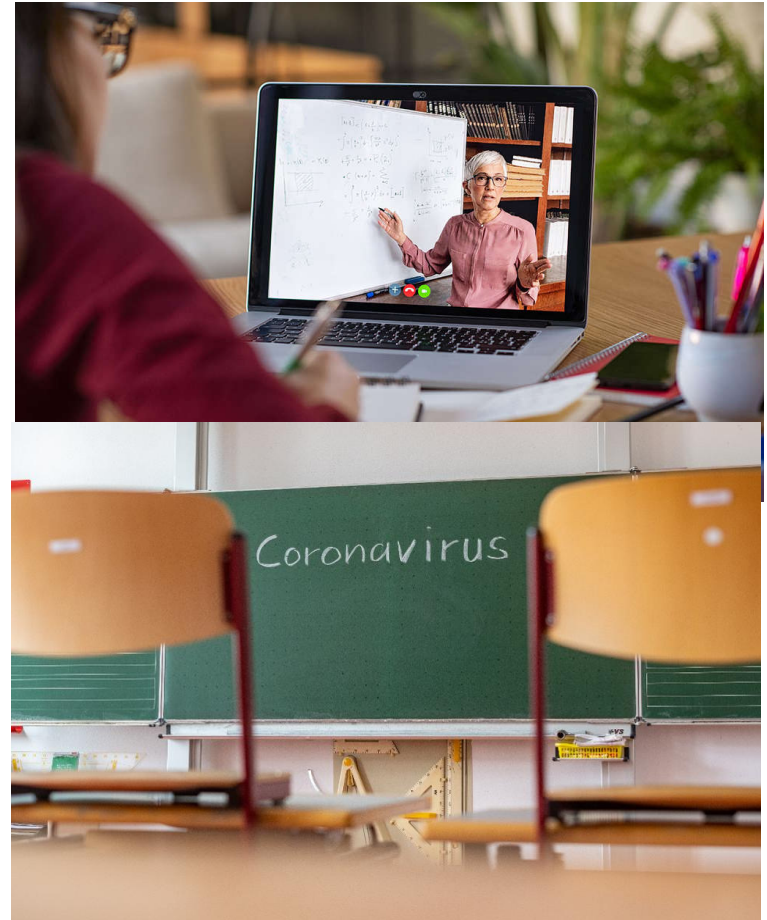
Promoting Deliberate Pedagogical Thinking with Technology in Physics Teacher Education: A Teacher Educator's Journey

Marina Milner-Bolotin, Ph. D.

This research has been approved by the University of British Columbia Ethics Research Board. The Ethics Board Certificate number: H15-01205

INTRODUCTION

David Goodstein, a notable physics educator at the Massachusetts Institute of Technology, and a co-



[Milner-Bolotin, M. (2016). Promoting Deliberate Pedagogical Thinking with Technology in physics teacher education: A teacher-educator's journey. In T. G. Ryan & K. A. McLeod (Eds.), *The Physics Educator: Tacit Praxes and Untold Stories* (pp. 112-141). Champaign, IL: Common Ground and The Learner.]

It Takes t and \$\$\$ to Create Successful Online Programs

online education covid



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Online learning begins for students across Ontario as COVID ...

Apr 6, 2020 - Students across Ontario began **online learning** Monday, more than three weeks after **COVID-19** shuttered schools in the name of physical ...

www.pearson.com › about › learning-online-during-pa... ▼

Working and learning online during a pandemic - Pearson

How we are helping students, families, and educators affected by **COVID-19** in Canada. Continuing **education** during uncertainty. At Pearson we recognize ...



**16,188 international students
from 140+ countries!**

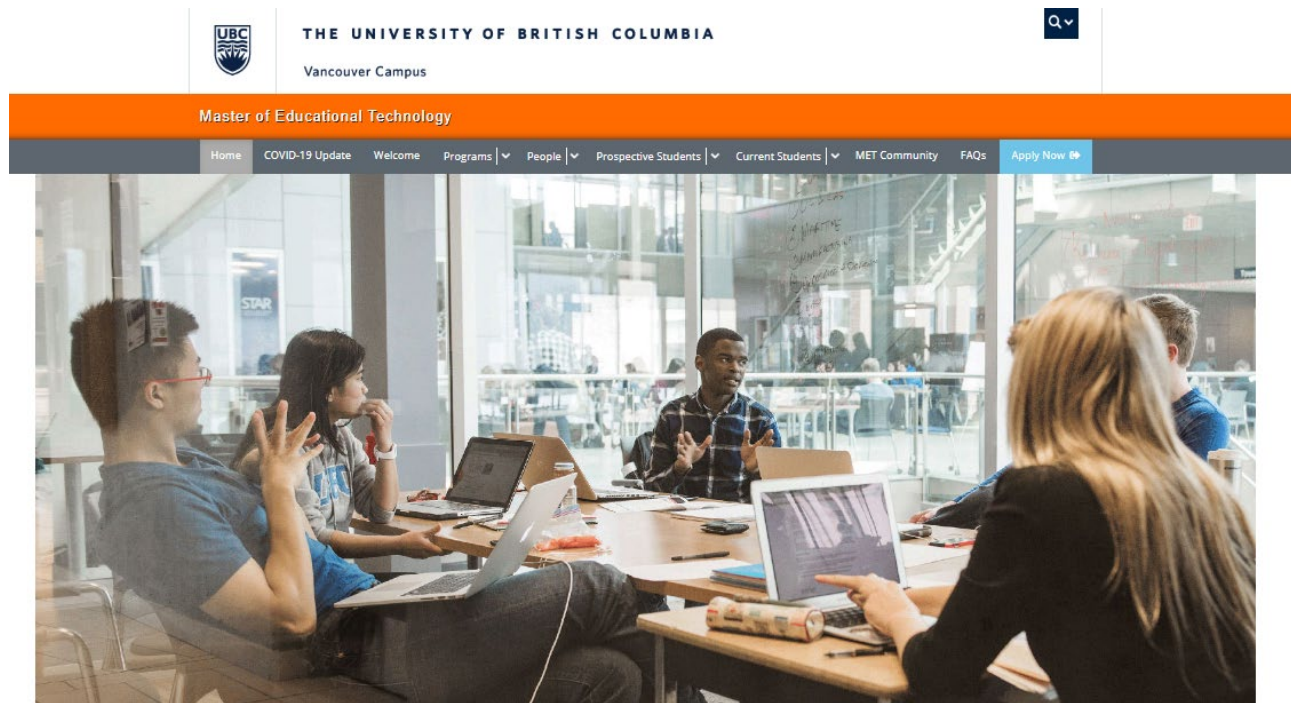
UBC FACTS

- Public university (est. 1908)
- 2 campuses
- **~65,000 Students**
- Acceptance rate: 64%
- Ranking – 35th (2019)
- **The best teacher ed.
program in the Province**
- ~1000 teacher candidates
- ~1000 graduate students



- Teachers' salary in BC increases if they earn an M.Ed.
- Few teachers can quit their jobs to pursue an M.Ed.
- Many teachers live far from UBC.
- Traffic in the Lower Mainland is very heavy.

We Turned to Online Learning in early 1990s



MET – International Online Graduate Program

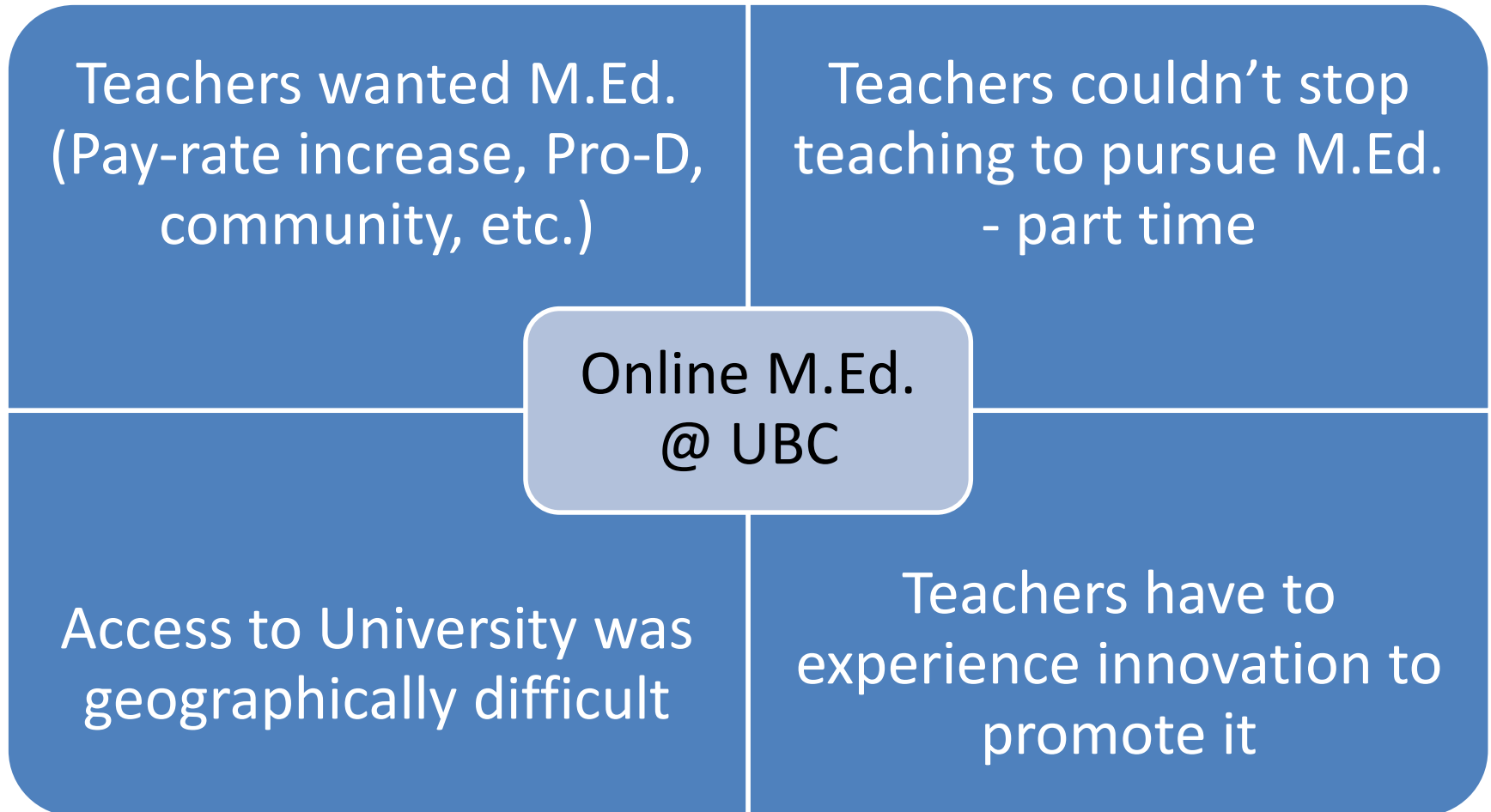
Collaborate | Innovate | Create

The Master of Educational Technology (MET) program educates professionals in the use and impact of digital learning technologies. This fully online graduate program provides a unique opportunity for our students to study and engage in:

- Technology-supported instruction
- Planning and management of learning technologies and eLearning
- Design and development of digital learning technologies and environments
- Digital literacy and digital culture in formal and informal learning contexts

MET faculty work on the leading edge of curriculum design and technology integration, digital culture, youth culture, digital literacy, gaming, and interface design. Our courses examine digital learning and culture from a wide

Motivation: New times, new learning opportunities



Examples of Innovative Online Grad Programs

1. Master of Museum Education MMed.

2. M.Ed. In Science Education

3. M.Ed. In Math. Education



MMed | Master of Museum Education

The study of education that occurs in museums and informal learning contexts.

Online (90%) | In Person (10%)

The Master of Museum Education is a unique graduate degree program focusing on the study of education and learning that occurs in museums and other informal learning contexts (such as art galleries, science centres, parks, historic sites, etc.). This program draws together Museum professionals, educators and those with an interest in using the community to support teaching and learning to further their thinking and scholarship around museums as sites of education and learning.

For examples of the exciting research conducted by students in this program, see the recent publication of some of their work in *Research Informing the Practice of Museum Educators: Diverse Audiences, Challenging Topics and Reflective Praxis*.

As museums contemplate new roles within society it will be incumbent upon museum professionals, and particularly museum educators, to become catalysts for different ways of thinking about the educational roles and potentials of museums and other informal learning sites, teaching and learning in museum settings as well as exploring new relationships between museums and the broader community.



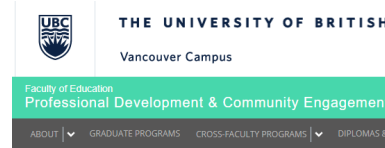
Quick Info:

Start Date: September 2020
Length: 2 years + 1 term, part-time
Format: Blended: Online & In Person
Location: UBC Vancouver/Off-Campus
Department: Department of Curriculum and Pedagogy

[Apply By: Closed](#)

Info Sessions:

to be announced
[View the recorded session from January 16, 2020](#)



MEd in Science Education

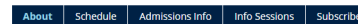
Fully online graduate program offered by leading UBC Science Education professors.

The Master of Education in Science Education is ideal for educators with a background or interest in science. This includes:

- Secondary and elementary science teachers
- Post-secondary science instructors
- Science educators in informal settings
- Any educator with an interest in science education

This graduate program offers students the opportunity to pursue a wide range of research and professional interests in the field of STEM education, with the emphasis on science education.

Through the pursuit of student individual and collective interests, graduate students will develop and enhance their knowledge and practice of science education. Graduate students will be equipped to advance the quality of education and assume leadership roles in the field.



Upon completing the MEd in Science Education degree, students will be able to:



MEd in Mathematics Education

The study of innovative strategies for teaching and learning Mathematics with/in Community

Fully Online!

This MEd in Mathematics Education is a unique fully online graduate program that explores approaches for constructing and living mathematics curriculum that is responsive to place/land and connected to community.

The program offers opportunities to study teaching and learning mathematics in diverse community contexts including:

- Teaching and learning gardens
- Cultural spaces
- Urban, rural and indigenous communities
- Artistic performances
- Inside and outside school classrooms
- Family settings
- Public spaces such as libraries, malls, community centres
- Issues important to communities such as climate change, poverty, and social justice



Master of Museum Education MMEd



THE UNIVERSITY OF BRITISH COLUMBIA

Vancouver Campus



Faculty of Education

Professional Development & Community Engagement

ABOUT

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ONLINE COURSES

INSTITUTES

OPEN LEARNING

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Format: Blended: Online & In Person

Location: UBC Vancouver/Off-Campus

Department: [Department of Curriculum and Pedagogy](#)

Apply By: Closed

Info Sessions:

to be announced

[View the recorded session from January 16, 2020](#)

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<https://pdce.educ.ubc.ca/mmed/>



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Vancouver Campus



Faculty of Education
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MEd in Science Education

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Upon completing the MEd in Science Education degree, students will be able to:

https://pdce.educ.ubc.ca/med_science/



Quick Info:

Start Date: September 2020
Length: 2 years + 1 term | part-time
Format: 100% Online
Location: off-campus
Department: [Department of Curriculum and Pedagogy](#)

Apply By: March 2, 2020

Info Sessions:

to be announced

[View the recorded session from January 23, 2020](#)

Contacts:

Dr. David Anderson

Research on Teachers in MEd in Science Education

1. Motivators to apply:

1. Pro-D
2. Pro Qualification
3. Ease of access
4. Interest in STEM

2. Teacher expectations:

1. Increased awareness of teaching tools
2. Increased science knowledge
3. Broader understanding of STEM education research
4. High-level learning experiences
5. Community of practice

3. Teachers' anxieties:

1. Time management
2. Workload
3. Knowledge of technology
4. Academic writing skills
5. Research knowledge
6. Content Knowledge

4. Strategies employed to succeed in M.Ed.

1. Familiarization
2. Time management plan
3. Self-organization
4. Self awareness
5. The role of colleagues and supportive others

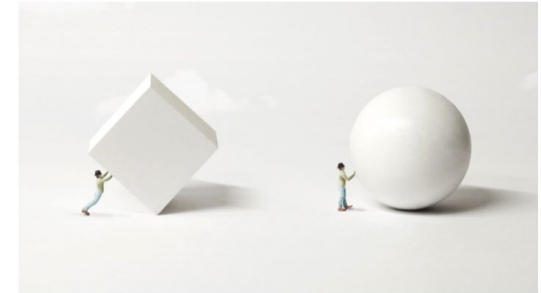
1. How do we make the sequence of courses meaningful – research-practice balance?
2. How do we make courses less predictable?
3. How do we manage time as instructors and help students?
4. How do we choose what technology to use, when and how to use it?
5. How do we create cohorts that work well together?
6. The cohorts are iterative, so we learn from each cohort?
7. How do we support faculty members in learning to teach online?

4

Challenges & Opportunities

Research opportunities:

- a) How do teachers learn in an online environment?
- b) How do teachers transform through the experience of online pedagogy?
- c) How does this transformation influence their own teaching?
- d) How do we support faculty members to embrace technology?
- e) How do we promote online learning and not emergency remote teaching?**



Yifat Ben-David Kolikant
Dragana Martinovic
Marina Milner-Bolotin Editors

STEM Teachers and Teaching in the Digital Era

Professional Expectations and
Advancement in the 21st Century
Schools

 Springer

- Milner-Bolotin, M. (2016). Rethinking technology-enhanced physics teacher education: From theory to practice. *Canadian Journal of Science, Mathematics and Technology Education*, 16(3), 284-295. doi:10.1080/14926156.2015.1119334
- Milner-Bolotin, M. (2019). Technology as a catalyst for 21st century STEM teacher education. In S. Yu, H. M. Niemi, & J. Mason (Eds.), *Shaping Future Schools with Digital Technology: An International Handbook* (pp. 179-199). Switzerland: Springer.
- Milner-Bolotin, M. (2018). Nurturing creativity in future mathematics teachers through embracing technology and failure. In V. Freiman & J. Tassell (Eds.), *Creativity and Technology in Math Education* (pp. 251-278). Cham, Switzerland: Springer.

5

Silver Lining of the Pandemic





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July 15-17, 2021



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<http://stem2020.ubc.ca/>

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Changing the Story

Welcome to the 6th International STEM in Education Conference

University of British Columbia, Vancouver, Canada



Dr. David Anderson

- Professor in Science Education
- Department of Curriculum & Pedagogy
- e-mail: david.anderson@ubc.ca
- Web site: <https://edcp.educ.ubc.ca/faculty-staff/david-anderson>





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- Web site: <http://blogs.ubc.ca/mmilner/>

