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

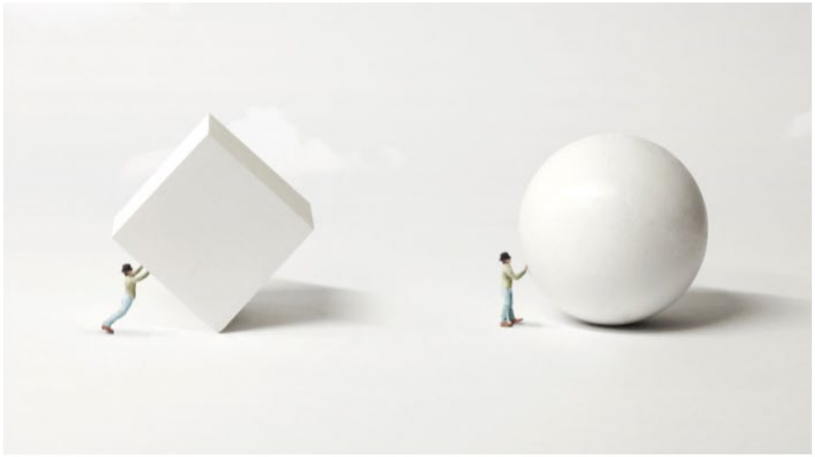
1. **Contemporary Context:** Online Education vs Emergency Remote Teaching.
2. **UBC Context:** History of Online Education at UBC FoE.
3. **Examples:** Museum Ed. & Master's in Science Ed.
4. **Challenges & Opportunities** for Research & Practice.
5. **Q&A**

1 Contemporary Context

The Difference Between Emergency Remote Teaching and Online Learning

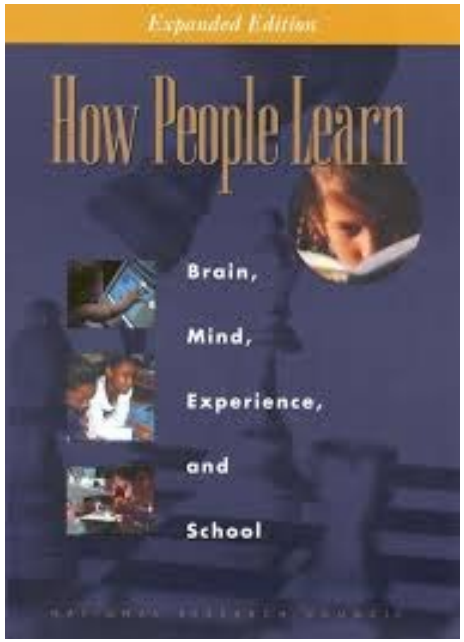
by **Charles Hodges**, **Stephanie Moore**, **Barb Lockee**, **Torrey Trust** and **Aaron Bond** Friday, March 27, 2020

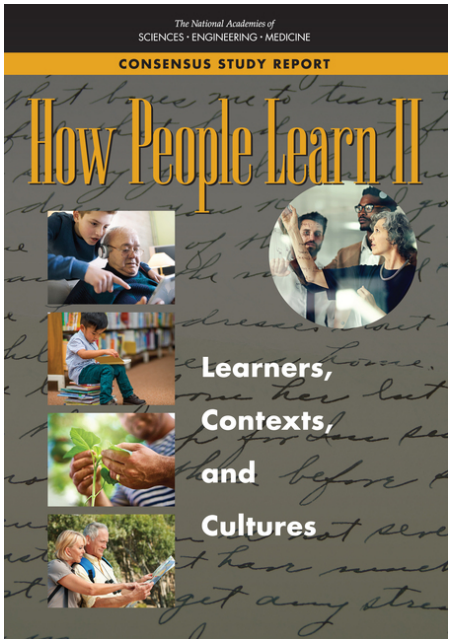
Well-planned online learning experiences are meaningfully different from courses offered online in response to a crisis or disaster. Colleges and universities working to maintain instruction during the COVID-19 pandemic should understand those differences when evaluating this emergency remote teaching.



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

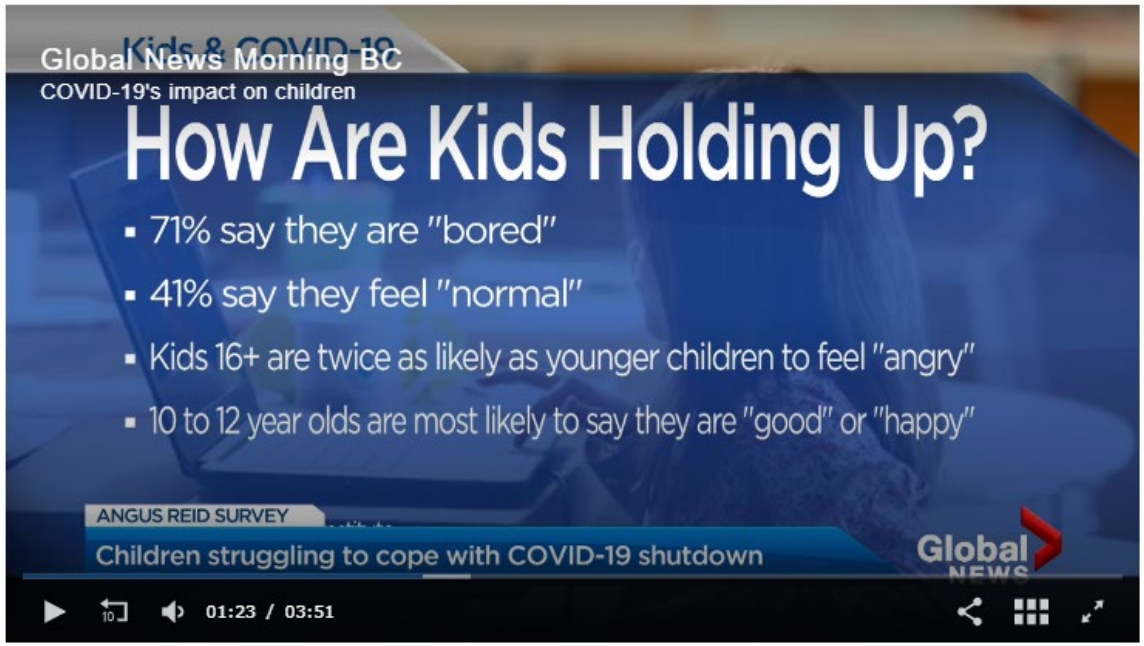
1 Contemporary Context

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



— 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/

1 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:](https://globalnews.ca/news/6922611/covid-19-kids-survey/)

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1 Teaching Context

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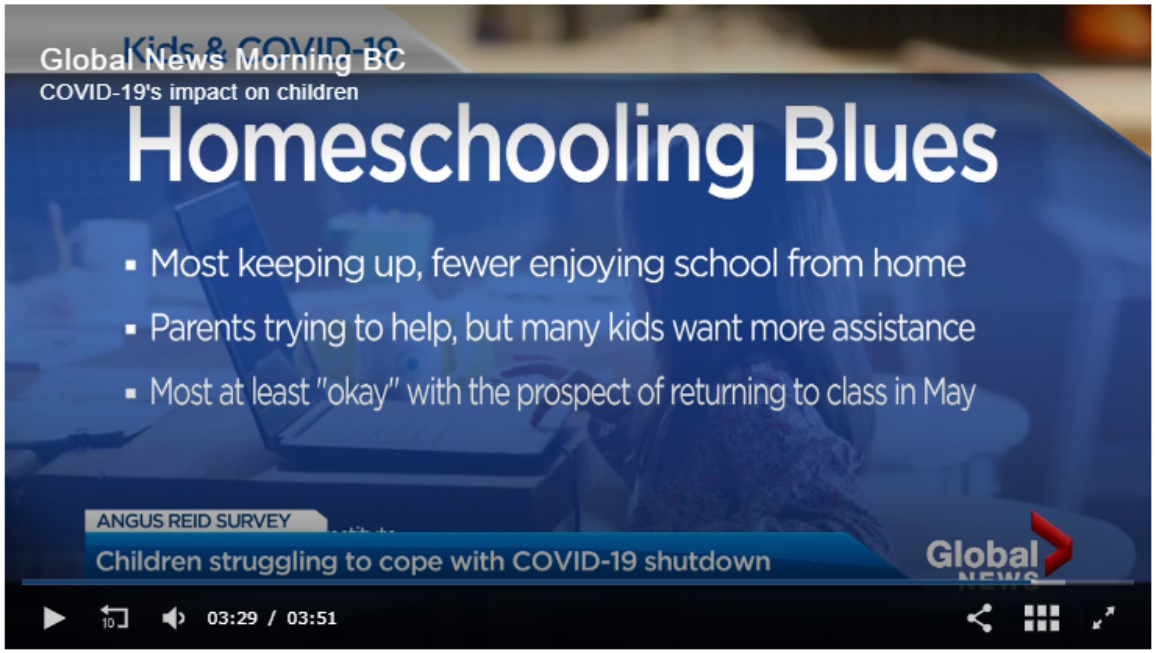

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Parental involvement is the key in successful online education for children. The kids who don't have family support are at a disadvantage.

1 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

1 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*.

1 Deliberate Use of Technology

CHAPTER 7

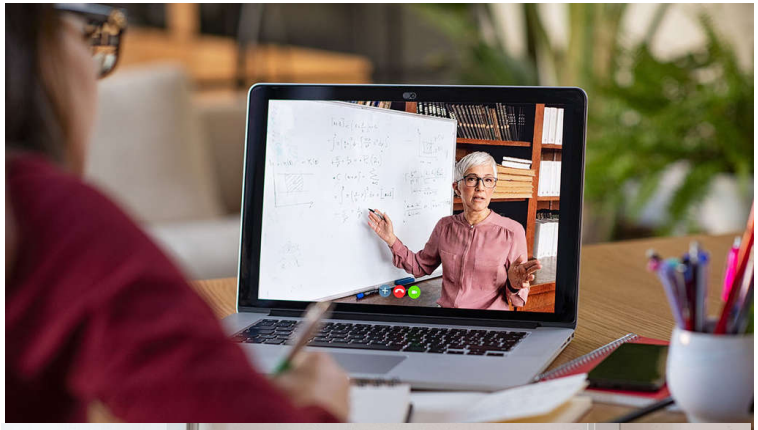
Promoting Deliberate Pedagogical Thinking with Technology in Physics Teacher Education: A Teacher Educator's Journey

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

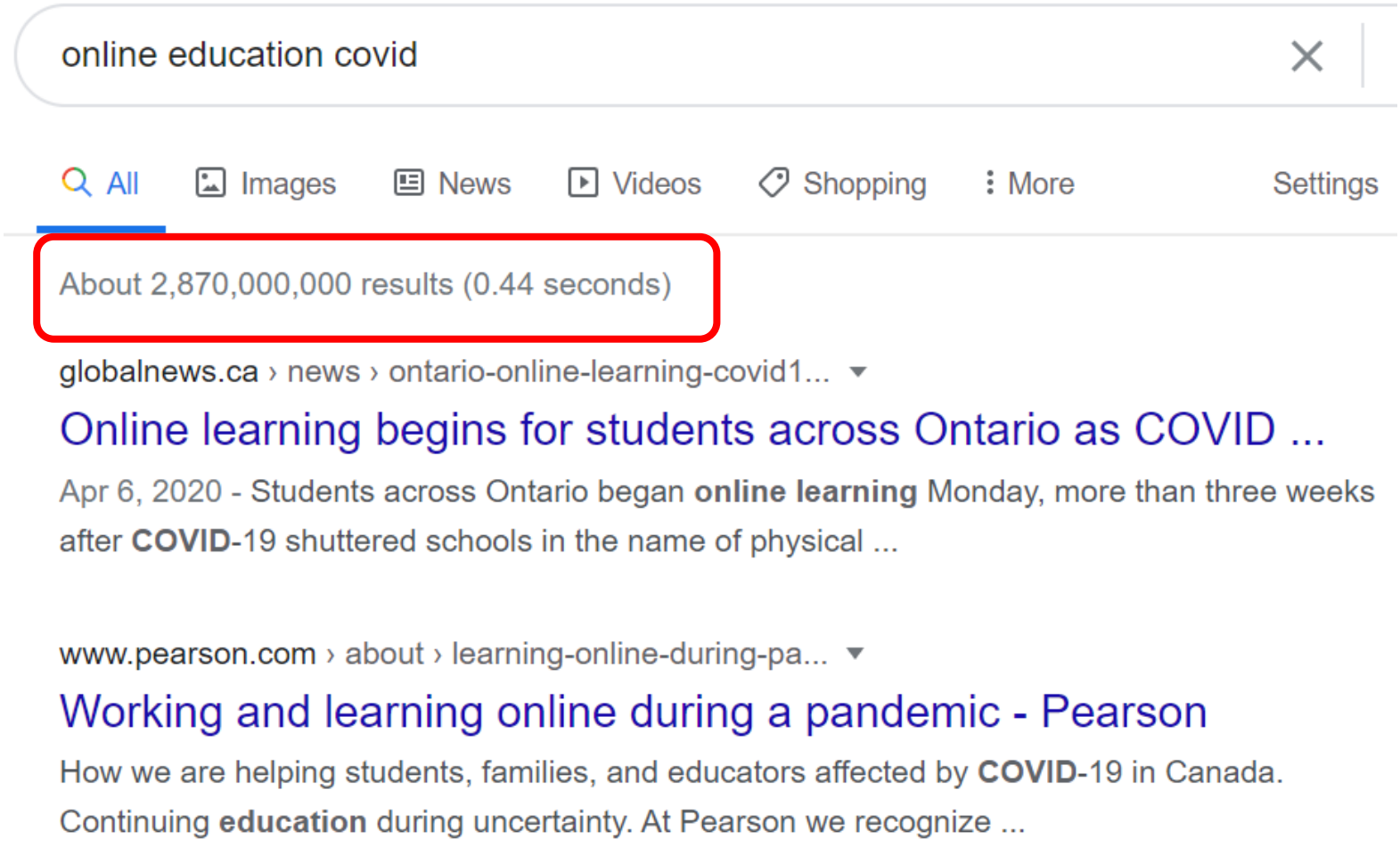
INTRODUCTION

David Goodstein, a notable physics educat
itute of Technology, and a cr



[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.]

1 It Takes *t* and $$$ to Create Successful Online Programs



2 UBC Context

16,188 international students from 140+ countries!

UBC FACTS

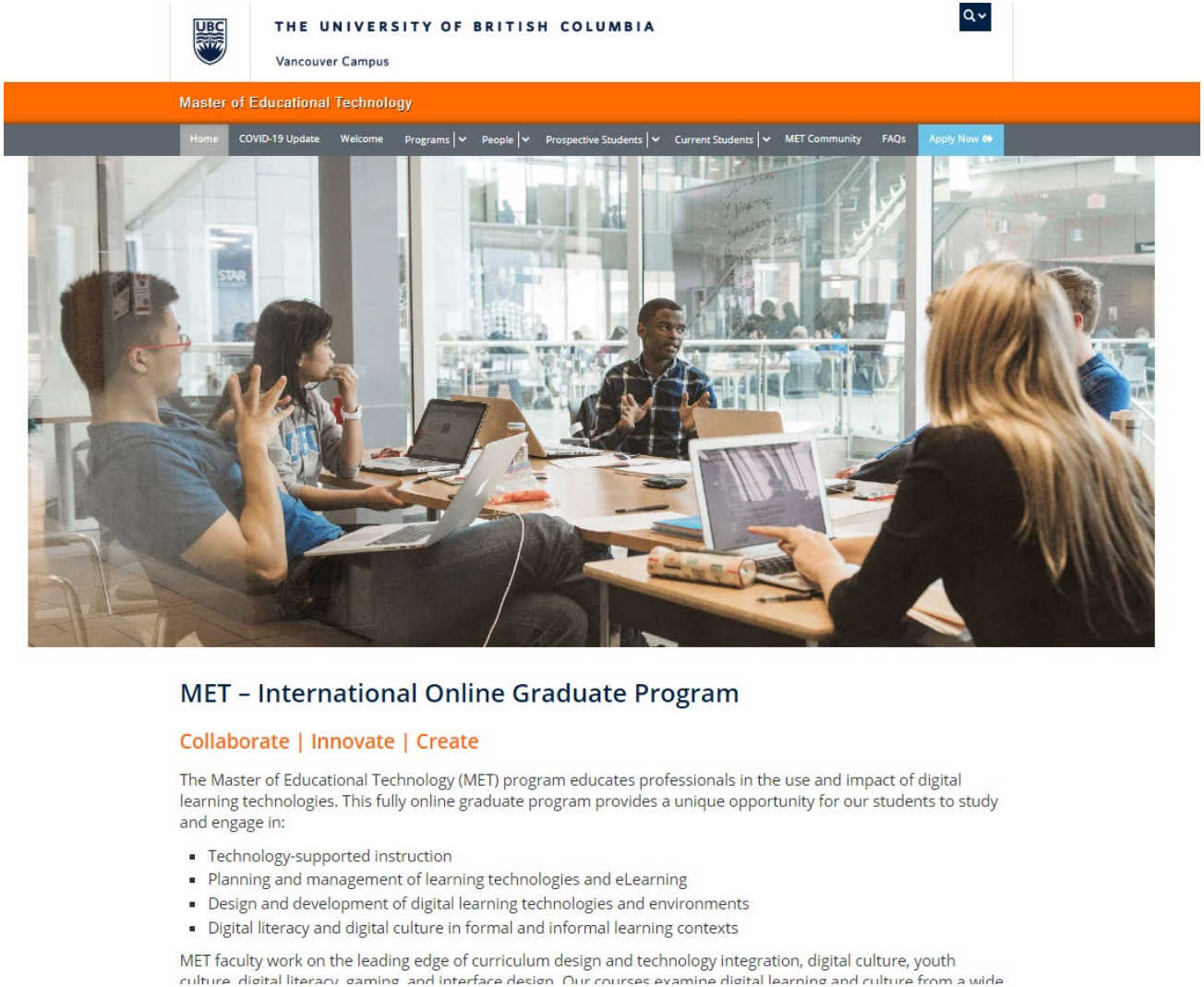
- Public university (est. 1908)
- 2 campuses
- **~65,000 Students**
- Acceptance rate: 64%
- Ranking – 35th (2019)
- **The best teacher ed. program in the Province**
- ~1000 teacher candidates
- ~1000 graduate students

2 Context: Online Learning

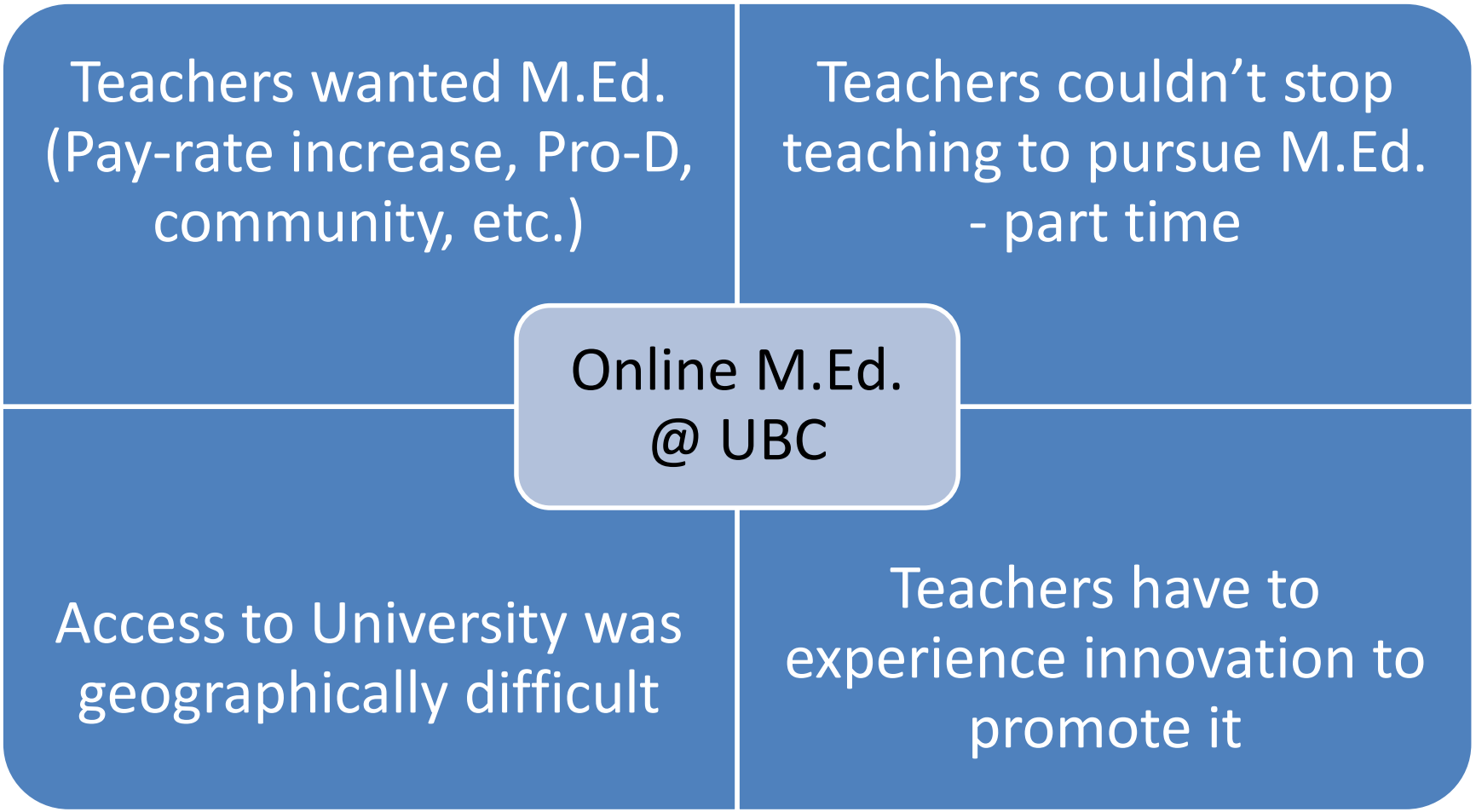
- Teachers' salary in BC increases if they earn an M.Ed.
- Few teachers can quit their jobs to pursue an M.Ed.
- Many teachers live far from UBC.
- Traffic in the Lower Mainland is very heavy.

2

We Turned to Online Learning in early 1990s

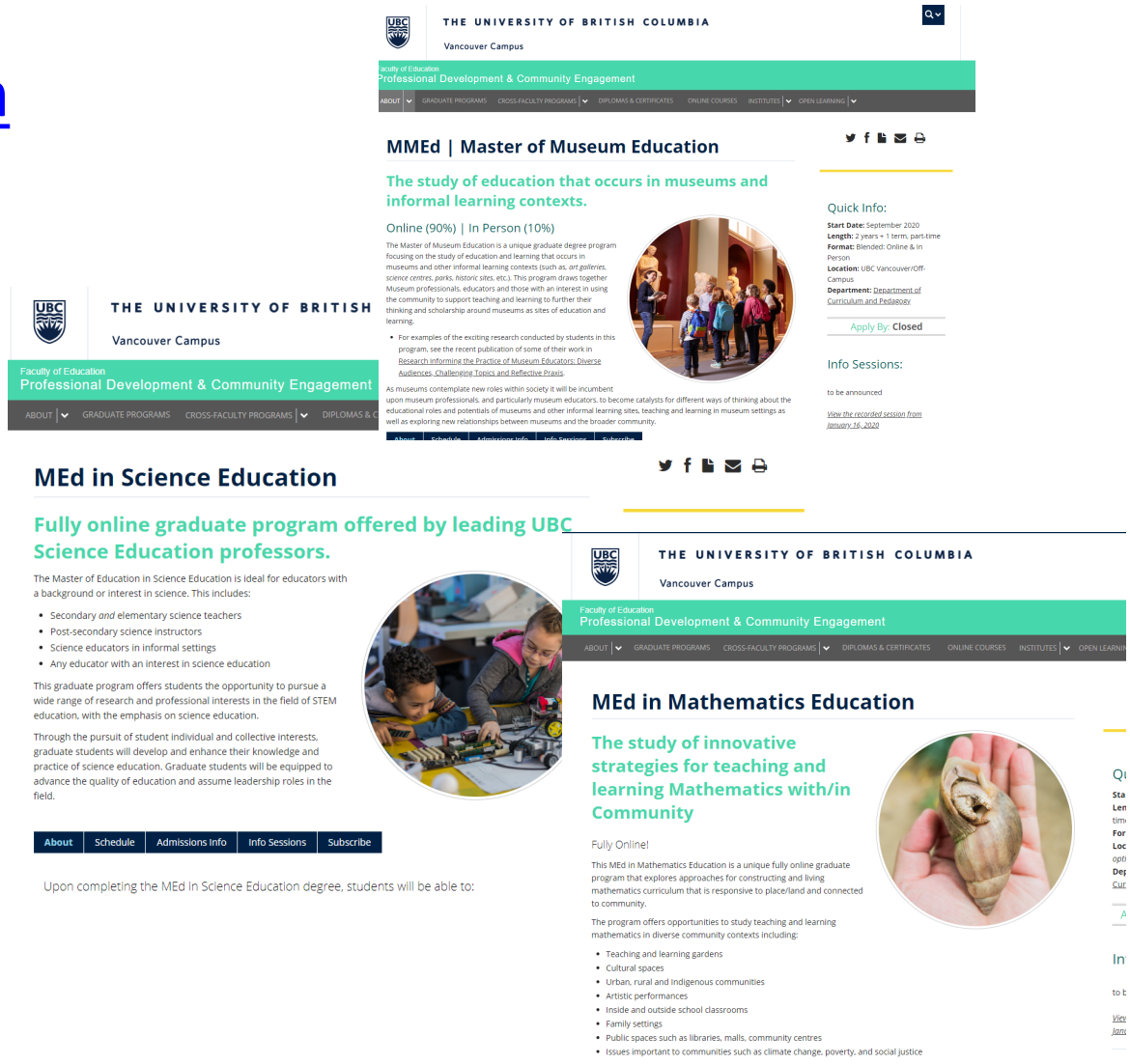


2 Motivation: New times, new learning opportunities



3 Examples of Innovative Online Grad Programs

1. Master of Museum Education MMEd.
2. M.Ed. In Science Education
3. M.Ed. In Math. Education



3

Master of Museum Education MMEd

THE UNIVERSITY OF BRITISH COLUMBIA

Vancouver Campus

Faculty of Education
Professional Development & Community Engagement

ABOUT | GRADUATE PROGRAMS | CROSS-FACULTY PROGRAMS | DIPLOMAS & CERTIFICATES | ONLINE COURSES | INSTITUTES | OPEN LEARNING

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.

About | Schedule | Admissions Info | Info Sessions | Subscribe

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

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

3 M.Ed. In Science Education

THE UNIVERSITY OF BRITISH COLUMBIA

Vancouver Campus

Faculty of Education
Professional Development & Community Engagement

ABOUT | GRADUATE PROGRAMS | CROSS-FACULTY PROGRAMS | DIPLOMAS & CERTIFICATES | ONLINE COURSES | INSTITUTES | OPEN LEARNING

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.

About | Schedule | Admissions Info | Info Sessions | Subscribe

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

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

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

4 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

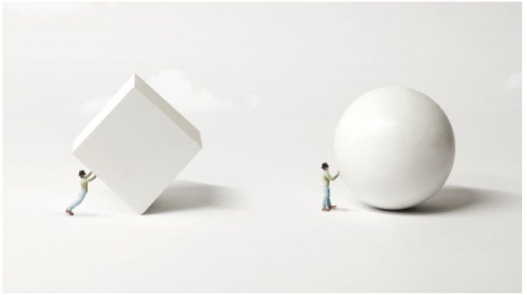
4. Strategies employed to succeed in M.Ed.

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

4 Challenges & Opportunities

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?

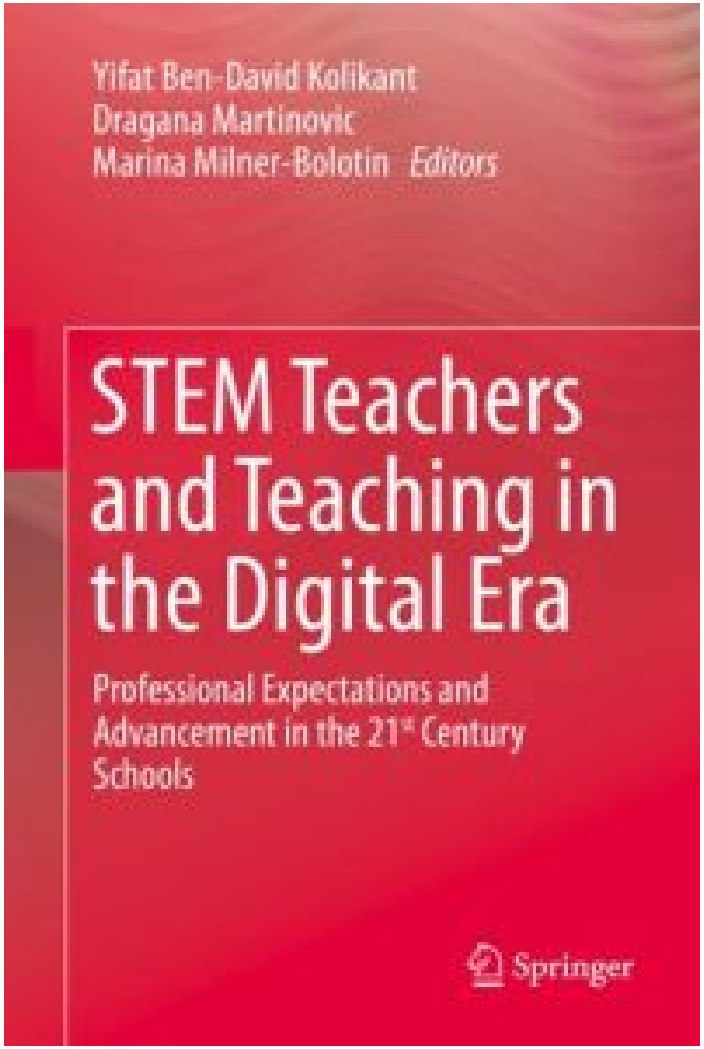
b) How do teachers transform through the experience of online pedagogy?

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?

5 Additional Resources



- 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

STEM 2021 @ UBC

July 15-17, 2021

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Changing the Story

Welcome to the 6th International STEM in Education Conference

University of British Columbia, Vancouver, Canada

http://stem2020.ubc.ca/

http://stem2021.ubc.ca/

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